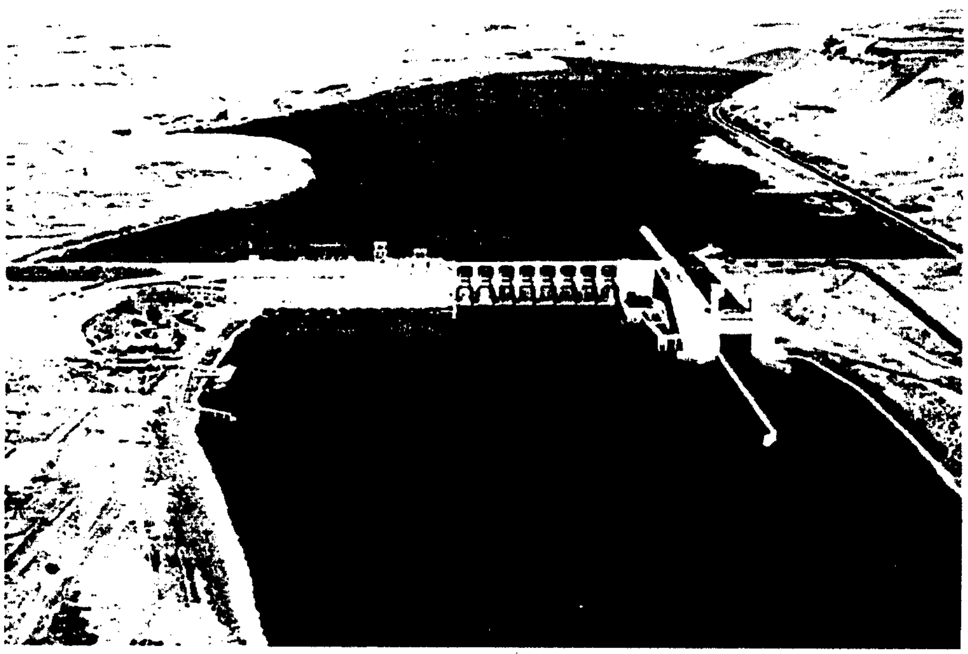
ENVIRONMENTAL ASSESSMENT

INTERIM LOWER SNAKE, CLEARWATER, AND MID-COLUMBIA RIVERS DREDGING

Lower Granite, Little Goose, Lower Monumental, Ice Harbor, and McNary Reservoirs

WASHINGTON, IDAHO, and OREGON



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This environmental assessment considers the effects of proposed interim navigation and maintenance dredging and dredged material disposal to be performed by the Walla Walla District Corps of Engineers at various locations in the lower Snake River, the lower Clearwater River, and the mid-Columbia River. This EA addresses dredging and disposal actions that would take place during the years 2000 through 2003, or until the Walla Walla District's Dredged Material Management Plan/Environmental Impact Statement is completed and in effect. The dredging to be performed is only that which is necessary until the DMMP/EIS is in place. The purpose of the dredging is to restore the authorized depth of the navigation channel, remove sediment from port areas, provide for recreational use, and provide for wildlife habitat planting irrigation.

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TABLE OF CONTENTS

PLATES

FIGURES

APPENDICES

A - Section 404(b)(1) Evaluation
B – Endangered Species Act Biological Assessment for Anadromous Fish
C - Endangered Species Act Biological Assessment for Terrestrial Species and Non-anadromous Fish

1. INTRODUCTION.

This environmental assessment (EA) considers the effects of proposed interim navigation and maintenance dredging and dredged material disposal to be performed by the Walla Walla District Corps of Engineers (Corps) at various locations in the lower Snake River, the lower Clearwater River, and the mid-Columbia River (Plates 1 - 17). This EA addresses dredging and disposal actions that would take place during the years 2000 through 2003, or until the Corps' Dredged Material Management Plan/Environmental Impact Statement (DMMP/EIS) is completed and in effect. The dredging to be performed is only that which is necessary until the DMMP/EIS is in place. The purpose of the dredging is to restore the authorized depth of the navigation channel, remove sediment from port areas, provide for recreational use, and provide for wildlife habitat planting irrigation. As required by the National Environmental Policy Act (NEPA) of 1969 and subsequent implementing regulations promulgated by the Council on Environmental Quality, this assessment is prepared to determine whether the action proposed by the Corps of Engineers (Corps) constitutes a "...major Federal action significantly affecting the quality of the human environment..." and whether an environmental impact statement is required.

2. PROJECT PURPOSE AND NEED.

The Corps is authorized by the River and Harbor Act of 1945 (Public Law 79-14) to maintain a navigation system on the lower Snake and Columbia Rivers. The navigation system includes five reservoirs: Ice Harbor, Lower Monumental, Little Goose and Lower Granite reservoirs on the lower Snake River, spanning the region from Tri-Cities, Washington east to Lewiston, Idaho; and McNary reservoir on the Columbia River between Umatilla, Oregon and Tri-Cities, Washington. These reservoirs are part of the Columbia/Snake River inland navigation waterway, which provides slack-water navigation from the mouth of the Columbia River near Astoria, Oregon, to port facilities on the Snake and Clearwater Rivers at Lewiston, Idaho, and Clarkston, Washington. Each of these reservoirs has required some level of dredging on a periodic basis to maintain the navigation channel at the minimum authorized depth of 14 feet.

The Corps also maintains recreation facilities and irrigated wildlife habitat management units (HMU's) as part of the lock and dam projects. The boat launch facilities and swimming beaches at the recreation sites periodically require dredging to remove accumulated sediment that reduces water depth and interferes with recreational use. Typically the depth is maintained at about 6 feet. The irrigation intakes at the wildlife HMU's also require periodic dredging to remove sediment that clogs the pumps. The Corps tries to maintain a water depth of 10 - 12 feet around the intakes. A history of dredging in the Walla Walla District is shown in Table 1.

Table 1
History of Dredging in Lower Snake River and McNary Reservoirs

Dredge Location	Year	Purpose	Amount Dredged (cubic yards)	Disposal
Excavation of Navigation Channel Ice Harbor Lock & Dam Part I & II, Channel Construction	1961	Navigation	3,309,500	Unavailable
Navigation Channel Ice Harbor Lock and Dam Part III, Channel Construction	1962	Navigation	120,000	Unavailable
Downstream Navigation Channel Ice Harbor Lock and Dam	1972	Navigation	80,000	Unavailable
Downstream Approach Navigation Channel Lower Monumental Lock and Dam	1972	Navigation	25,000	Unavailable
Navigation Channel Downstream of Ice Harbor Lock and Dam	1973	Navigation	185,000	Unavailable
Downstream Approach Channel Construction Lower Monumental Lock	1977	Navigation	10,000	Unavailable
Downstream Approach Channel Construction Ice Harbor Lock	1978	Navigation	110,000	Unavailable
Downstream Approach Channel Construction Ice Harbor Lock	1978/ 81/82	Navigation	816,814	Unavailable
Recreation Areas (Corps)	1975 - Present	Recreation	20,000	Upland Sites
Port of Lewiston (Corps)	1982	Navigation/ Maintain Flow Conveyance Capacity	256,175	Upland Site
Port of Clarkston (Port)	1982	Navigation	5,000	Upland Site
Downstream Approach Channel Construction Ice Harbor Lock	1985	Navigation	98,826	In-Water
Confluence Area (Corps)	1985	Maintain Flow Conveyance Capacity	771,002	Wilma HMU
Port of Lewiston (Corps)	1986	Navigation/ Maintain Flow Conveyance Capacity	378,000	Upland Sites
Confluence Area and Schultz Bar (Corps)	1988	Maintain Flow Conveyance Capacity	915,970	In-Water and Upland Site
Confluence Area (Corps)	1989	Maintain Flow Conveyance Capacity	993,445	In-Water
Schultz Bar (Corps)	1990	Navigation	27,335	NA

Table 1 History of Dredging in Lower Snake River and McNary Reservoirs				
Dredge Location	**Year**	**Purpose**	**Amount Dredged (cubic yards)**	**Disposal**
Confluence Area (Corps)	1992	Maintain Flow Conveyance Capacity	520,695	In-Water
Ports of Lewiston, Almota, and Walla Walla	1991/92	Navigation	90,741	Unavailable
Boise Cascade	1992	Navigation	120,742	In-Water
Port of Kennewick	1993	Navigation	6,130	NA
Schultz Bar (Corps)	1995	Navigation	14,100	In-Water
Confluence Area (Corps)	1996/97	Navigation	68,701	In-Water
Confluence Area (Corps)	1997/98	Navigation	215,205	In-Water
Greenbelt Boat Basin Clarkston	1997/98	Navigation	5,601	In-Water
Port of Lewiston (Port)	1997/98	Navigation	3,687	In-Water
Port of Clarkston (Port)	1997/98	Navigation	12,154	In-Water
Lower Granite Navigation Lock Approach	1997/98	Navigation	2,805	In-Water
Lower Monumental Navigation Lock Approach	1998/99	Navigation	5,483	In-Water
Source: USFWS, August 1998/Corps, July 19, 1995, and September 2, 1999.				

The Corps is currently preparing a Dredged Material Management Plan/ Environmental Impact Statement (DMMP/EIS) to evaluate the dredged material management requirements for the navigable waterways within its boundaries for the next 20 years. This is being conducted under the guidance provided in Engineer Circular (EC) 1165-2-200, which directs the development of DMMP's for federal navigation projects, groups of inter-related harbor projects, and systems of inland waterway projects. It is Corps policy to dispose of dredged material associated with the construction or maintenance dredging of navigation projects in a manner that is the least costly, is consistent with sound engineering practice, and that meets federal environmental standards.

The Corps had anticipated completing the DMMP/EIS prior to the need to dredge in 2000-2001. However, changes in the preferred alternative have delayed release of the draft DMMP/EIS until late in 2000. This has delayed the Record of Decision until probably sometime in 2001. Because the Corps needs to dredge prior to 2001 to meet its obligations for navigation channel maintenance, recreation, and wildlife management, the Corps has prepared this interim EA to address dredging and dredged material disposal needs until the DMMP/EIS is completed and implemented.

To maintain the navigation channel and other facilities during this interim period, the Corps proposes to dredge up to 500,000 cubic yards of material each year in which dredging is performed. The majority of the dredging would take place in the Clarkston, Washington/ Lewiston, Idaho area at the confluence of the Snake and Clearwater Rivers (Plates 17, 18, and 19). This confluence area has a chronic

sedimentation problem caused by the two rivers converging in slackwater at the upstream end of Lower Granite reservoir. The Corps dredges the area periodically to maintain the needed depth of 14 feet for navigation. Surveys conducted in August 1999 indicated that water depth in the navigation channel has been reduced to as little as 10 feet in some locations in the confluence area. Sediment needs to be removed from the channel to restore the authorized depth and provide unrestricted navigational use.

The Corps plans to remove an estimated 183,120 cubic yards of sediment from the federal navigation channel at the confluence during the winter of 2000-2001. The area to be dredged extends from River Mile (RM) 138 on the Snake River to the confluence of the Snake and Clearwater Rivers at RM 139, then extends up the Clearwater River to just downstream of Memorial Bridge at RM 2 (Plates 17 and 19). The federal navigation channel extends to within 50 feet of port structures and the Corps is responsible for maintaining this channel.

The Corps also plans to remove sediment from several other locations in the confluence area in 2000-2001. Two of these locations are port berthing areas – the Port of Clarkston at RM 139 on the Snake River, and the Port of Lewiston at RM 1 – RM 1.5 in the lower Clearwater River (Plates 20 and 21). The port areas parallel the federal channel and the ports are responsible for maintaining access from the federal channel. About 5,559 cubic yards of sediment would be removed from the Port of Clarkston and about 1,700 cubic yards would be removed from the Port of Lewiston. Both ports have signed memorandums of agreement with the Corps to dredge these areas and the ports will reimburse the Corps for the costs of dredging and disposal of the material removed from the port areas.

Another port-controlled area to be dredged in 2000-2001 is the entrance to Hells Canyon Resort Marina, located on the left bank of the Snake River at RM 138 (Plate 22). The marina is on land owned by the Corps, but leased to the Port of Clarkston and subleased to a local operator. At the request of the Port of Clarkston, the Corps plans to remove about 3,532 cubic yards of silt/sand from the marina entrance. This dredging is included in the memorandum of agreement mentioned above.

Additional areas to be dredged in the confluence area in 2000-2001 include the Greenbelt Boat Basin at RM 139.5 on the Snake River at Clarkston, and the Swallows Park swimming beach and Swallows Park boat launch (RM 141.7 and RM 141.9) on the Snake River at Clarkston (Plates 23 and 24). The Greenbelt Boat Basin is located behind the Corps' Clarkston Resources Office at the confluence and is maintained by the Corps for public recreation use. Swallows Park is located upstream of the confluence and is operated and maintained by the Corps. The Corps plans to remove 2,747 cubic yards of sediment from Greenbelt Boat Basin and 24,852 cubic yards of sand/silt from the Swallows swimming beach and boat launch.

The Corps plans to dredge several other areas outside of the confluence area in 2000-2001. Two of these are for navigation channel restoration – the downstream

approach to Lower Granite Dam navigation lock (RM 107) and the downstream approach to Lower Monumental Dam navigation lock (RM 41.5) (Plates 25 and 26). About 3,139 cubic yards of sediment would be removed from an area about 500 feet long by 200 feet wide downstream of the Lower Granite navigation lock guidewall. About 10,987 cubic yards would be removed from the Lower Monumental approach. This area is about 250 feet wide and extends about 2,300 feet downstream from the navigation lock. There are also two boat launch areas at two Corps recreation sites that the Corps plans to dredge: Illia boat launch at RM 104 (1,439 cubic yards) and Willow boat launch at RM 88 (3,924 cubic yards) (Plates 27 and 28). There is also one irrigation intake at Hollebeke HMU (RM 25) (Plate 29) that requires sediment removal. The dredging at the intake may also involve dredging an access channel about 1,000 feet long from the Snake River to the intake. Up to 3,270 cubic yards of material would be removed.

Table 2 below lists the sites the Corps proposes to dredge in 2000-2001 and the estimated quantities for each.

Site to be Dredged	Quantity to be Dredged (in cubic yards)
Federal navigation channel at confluence of Snake and Clearwater Rivers	183,120
Port of Clarkston	5,559
Port of Lewiston	1,700
Hells Canyon Resort Marina	3,532
Greenbelt Boat Basin	2,747
Swallows swim beach/boat basin	24,852
Lower Granite Dam navigation lock approach	3,139
Lower Monumental Dam navigation lock approach	10,987
Illia boat launch	1,439
Willow Landing boat launch	3,924
Hollebeke HMU irrigation intake	3,270
TOTAL	**244,269**

The Corps has tentatively identified two areas that may be dredged in 2001-2002. These are the Port of Walla Walla barge slip access channel at the Boise Cascade plant and the federal navigation channel in the Schultz Bar area (Plates 4 and 15). The Port of Walla Walla access channel is on the Columbia River at RM 316.5. This channel is about 10,140 feet long and is located on the left bank of the river in an area prone to sediment deposition. The Corps has been asked by the Port of Walla Walla to dredge this channel. An estimated 121,000 cubic yards of material would need to be removed from the channel. The Schultz Bar area is at RM 105-101 on the Snake River. This is an area of chronic sediment deposition and the Corps periodically dredges the area to

restore the authorized navigation channel depth. Up to 75,000 cubic yards of sediment would be removed.

The Corps has not yet identified any areas to be dredged after the winter of 2001-2002. The need to dredge will depend on flow conditions each year and the amount of sediment deposited.

3. ALTERNATIVE ACTIONS.

The alternative actions are differentiated by the dredged material disposal method, not the dredging method. All dredging would be done using mechanical dredging methods. These would include clamshell, dragline, backhoe or shovel/scoop, although based on previous dredging activities, the method used would probably be clamshell for most of the dredging. For the boat basins and the irrigation intake dredging, the method would most likely be backhoe. All dredging would take place during the established in-water work windows of December 15 - March 1 for the Snake and Clearwater Rivers and December 1 - March 31 for the Columbia River.

a. No Action

Under this alternative the Corps would not perform interim navigation dredging prior to the implementation of the DMMP. The navigation channel would remain partially filled in with sediment and would continue to fill in as more sediment is deposited. Barges would continue to have a chance of grounding and there would be more opportunities for grounding as the channel filled in. Barge operators would possibly lighten their loads to prevent grounding. The boat basins would continue to fill with sediment until the boat ramps and basins would be unusable. Boaters would have to use other facilities to launch their boats. The irrigation intakes at the HMU's would cease to function and the Corps would need to attempt to relocate the intakes, dig wells, or discontinue irrigation and risk losing the habitat plantings. If the plantings fail, the Corps would not meet its wildlife mitigation requirements. The Ports may pursue other means to dredge the port sites. This alternative does not address the Corps' responsibility to provide for navigation, an authorized project purpose. No other environmental effects are anticipated and this alternative will not be discussed further.

b. No Change - In-water Disposal

Under this alternative, the Corps would perform necessary dredging and would continue to dispose of dredged material in-water using the same method used for the 1997/98 dredging. In general, material would be scooped from the river bottom and loaded onto a bottom-dump barge. The contractor would be allowed to overspill excess water from the barge while the barge is being loaded. The water would be discharged a minimum of 2 feet below the river surface. The Corps estimates it could take about 6-8 hours to fill a barge. The barge would then be pushed by a tug to the disposal site. No

material or water would be discharged from the barge while it is in transit. Once the barge arrived at the appropriate disposal site, the bottom would be opened to dump the material all at once. The barge would then be returned to the dredging site for additional loads. The contractor could be expected to work between 10 and 24 hours per day 6-7 days per week. For small, off-channel sites such as boat basins, swim beaches, or irrigation intakes, the material would either be loaded onto barges for transport to the in-water disposal site, or loaded into dump trucks for upland disposal.

Disposal of all dredged material (except as noted above for small dredging activities) would be in-water in one of three types of in-water disposal areas: (1) shallow water, 0 – to 20 feet below the surface; (2) mid-depth, 20 to 60 feet below the surface; and (3) deep-water disposal, 60 feet below the surface and deeper. The disposal area to be used would depend on the composition of the dredged material. Samples would be taken from the barge during loading to determine which disposal area would be used. If the material is at least 80% sand (grains greater than 0.2 mm in diameter), the barge would be directed to a shallow water or mid-depth disposal area. Sands, gravels, and cobbles are expected to comprise 85 percent of the total dredged material. The remaining 15 percent of material that is silt or finer would be deposited in deep water areas. For the shallow and mid-depth sites, dredged material would be dumped as close to the shoreline as possible until no more sand is available or until the material reaches a depth at which barges can no longer float over the site to dispose of material. The intent of the disposal would be to create a shallow-water bench parallel to the shoreline.

If the dredged material sampled is more than 20% silt or organic material, it would be dumped at the deep water sites. The barges would dump the material across the river channel in a back and forth pattern until the water depth is about 66 feet deep, then start working their way downstream. This would help to distribute the material more evenly across the river bottom.

The classification of the dredged material as silt, sand, or gravel/cobbles, and the designation of shallow, mid-depth, and deep in-water disposal areas is based on a multi-year study conducted by the Corps and Dr. David Bennett of the University of Idaho. In the late 1980's and early 1990's, the Corps did several test disposals of dredged materials in Lower Granite reservoir. Dr. Bennett and his students then conducted several studies through the mid-1990's to determine the effects of the dredged material disposal on the aquatic environment, especially on salmonid stocks and sturgeon. Dr. Bennett was able to use the results of these studies to make recommendations on how to dispose of dredged material in a way that could benefit salmon or at least not harm salmon. His studies indicated that disposing of sand and cobbles in mid-depth or shallow-water sites can be beneficial because it creates important fish habitat, especially for juvenile fall chinook salmon. His studies also indicated that silt as a substrate has no benefit for salmon, and that disposing of the silt in deep-water sites would have no impact, either positive or negative, on aquatic species.

The type of material to be dredged depends on the location of the dredging. In the Snake/Clearwater Rivers confluence area, the Corps expects to find a mix of coarse sand, fine sand, silt, fine silt, and organic material (wood particles). This determination is based on samples taken during previous dredging operations and samples taken in June 2000 for the 2000-2001 dredging. The Corps expects to find sand in the main navigation channel and silt/fines near the shore, in the port areas, and in the Greenbelt Boat Basin. The Corps also expects to find silt in the other boat basins, the irrigation intakes, and the Port of Walla Walla channel at Boise Cascade. In the area below the Lower Granite and the Lower Monumental navigation locks, the Corps expects to find river cobbles 2-6 inches in diameter with little fines and possibly some large rock up to 18 inches in diameter. The Corps expects to find sand in the Swallows Beach swim area and the Schultz Bar area.

All dredging and disposal actions would take place within the established in-water work window of December 15 - March 1 for the Snake and Clearwater Rivers and December 1 – March 31 for the Columbia River to avoid impacting anadromous fish. Prior to dredging, the Corps would conduct salmon redd surveys in areas likely to contain redds to ensure no redds would be disturbed by dredging or disposal. Based on previous surveys, it is anticipated that redds are most likely to be found only in the dredging areas immediately downstream of the dams.

This alternative was removed from further consideration because it isn't the alternative that most adequately meets the requirements of Section 404 of the Clean Water Act. The Clean Water Act prohibits filling of waters of the U.S. when a practicable alternative exists. The Region 10 office of the Environmental Protection Agency (EPA) has stated because the Corps could dispose of the material in an upland disposal site (see alternative c below), the Corps would need to select the upland disposal alternative to meet the requirements of the Clean Water Act. However, EPA has stated that in-water disposal of dredged material would be acceptable if the material was used in a beneficial way, such as the creation of a base for shallow water fish habitat (alternative d below). Because the No Change alternative includes disposal of silt in the deep water disposal sites, which has no environmental benefit, this alternative was removed from further consideration.

c. Upland Disposal

Under this alternative, the Corps would perform necessary dredging, but would dispose of the dredged material in an upland site instead of in-water. The disposal area for the dredged material would be the Joso HMU, which is located on the left bank of the Snake River at RM 56.5 - 56.8 (Plate 11). This center portion of this site was used as a gravel quarry by the Corps during the construction of Lower Monumental Dam and the associated facilities. A barge slip still exists at the downstream end of the site. The Corps estimates the site could store up to 6.4 million cubic yards of material, which is several times the amount of material expected to be dredged during this interim period.

In order to use Joso HMU for dredged material disposal, the Corps would need to reconstruct the barge slip using sheet pile to provide vertical walls and tie off facilities (Figure 1). The Corps would also need to construct temporary dredged material dewatering and storage areas with containment berms and detention ponds adjacent to the slip. This is because the material would be off-loaded from the barges and placed in the temporary storage for dewatering, then would be loaded onto trucks for transport to the disposal area. The material would then be placed in lifts using track-type tractors and compacted, resulting in a large structural fill conforming to the established final topography for the disposal area. Areas that reach final grades would be restored on a periodic basis by placing six inches of topsoil and re-seeding with native grasses to achieve a vegetative cover similar to the surrounding site areas. Filling the gravel pit with sediment and seeding it to grass would improve the site's value as wildlife habitat.

This alternative was eliminated from further discussion as the Corps determined it would take too much time to implement and is cost-prohibitive. The Corps does not have sufficient lead time or funding to prepare the site for dredged material disposal for the 2000-2001 dredging operation. The Corps also determined that the cost to transport the sediment to the Joso site would be about 2-3 times higher than the cost for in-water disposal.

d. <u>Proposed Action - In-water Disposal or Other Beneficial Use</u>

Under this alternative, the Corps would perform the necessary dredging as described in Alternative b No Change and would use in-water disposal for the majority of the dredged material to create shallow water and mid-depth fish habitat, but would not dispose of silt in the deep-water sites. The Corps has identified disposal locations for the dredging to be performed in 2000-2001. However, the prioritization of the disposal locations to be used for the remainder of the interim period may change. After the 2000-2001 dredging, the Corps would use a Regional Dredging Team (RDT) made up of agencies and stakeholders to assist in identifying other beneficial uses of the dredged material and prioritizing disposal locations [see section 2.d.2) below]. The RDT was formed too late in the summer of 2000 to identify and prioritize beneficial uses of dredged material for the 2000-2001 dredging.

1) 2000-2001 Dredging

For the 2000-2001 dredging, the Corps would dispose of dredged material in a way similar to that used in Alternative b No Change. The Corps would select the disposal area based on the physical characteristics of the dredged material and its suitability for use in fish habitat creation. The disposal area would also be determined by the location of the site to be dredged. The Corps has collected sediment samples from the areas to be dredged and has identified which sites or portions of sites contain mostly silt and which ones contain mostly sand or coarser material. For all of the dredging except the for Lower Monumental Dam navigation lock approach, the disposal

location would be at RM 116 in Lower Granite reservoir (Plates 15, 16, and 30). This site is a shallow bench on the left bank of the Snake River just upstream of Knoxway Canyon. The Corps selected this site because it is close to the confluence (where most of the dredging would occur), could provide suitable resting/rearing habitat for juvenile salmon once the river bottom is raised, would not interfere with navigation, would not impact cultural resources, and is of sufficient size to accommodate dredged material disposal for several years.

The sequence of dredged material disposal at RM 116 is designed to accomplish two goals: 1) create shallow water habitat for juvenile salmon, and 2) dispose of silt in a beneficial manner. Dr. Bennett's studies indicated that substrate of sand, gravel, and/or cobble provided suitable habitat for juvenile salmon while a silt substrate provided no benefit. To meet its goals while following Dr. Bennett's criteria, the Corps proposes to place the dredged material in steps. The first step would be to use the silt (less than 0.2 mm in diameter) in a mixture with sand and gravel/cobble to fill the mid-depth portion of the site and form a base embankment. The dredged material would be placed aboard bottom dump barges and analyzed to determine the percentage sand or silt. The barges would then proceed to the disposal area and would dump the material within the designated footprint close to the shoreline to raise the river bottom to a depth of 20 feet (Plate 32 and Figure 2). The second step would be to place sand on top of the sand/silt embankment. The contractor would be directed to reserve an area of sand as his final dredging site. The contractor would use barges to dump the sand on top of the base embankment so a layer of sand at least 10 feet thick covers the embankment and the water depth is about 10 feet deep as measured at minimum operating pool (Figure 3). The footprint of the disposal area would be sized so that the maximum amount of shallow water sandy substrate habitat is created with the estimated quantities of material to be dredged. The third step would be to use a beam drag to flatten and level the tops of the mounds to form a flat, gently sloping (3-5%) shallow area between 10 and 12 feet in depth (Figure 4).

There is some question of embankment stability because of the amount of silt to be incorporated in the embankment. The Corps is concerned that the silt may slump or compress, causing a loss in elevation of the finished embankment. The Corps plans to have the contractor monitor and record the amount of silt placed in the embankment. The Corps will then determine the percent silt in the base and monitor any movement of the base. Monitoring would be accomplished by taking cross-section soundings after disposal is complete and again in the summer after high flows to determine if the embankment slumps or moves. The Corps would use this information to make adjustments in the percentage of silt allowable for future dredged material disposal and to determine whether or not a berm needs to be constructed around the toe of the embankment to prevent movement.

The material removed from the Lower Monumental navigation lock approach would be disposed of at Lost Island HMU, which is located in the Ice Harbor reservoir on the right bank of the Snake River at RM 22-23 (Plates 9 and 31). The site is on the

downstream end of a river bar and was used as the disposal site for the 1998-1999 dredging of the same navigation lock approach. Water depth at the site is about 35 feet deep. A small mound of cobbles from the previous disposal is located near the shoreline. The contractor would nudge the barge as close to the river bank as possible at the upstream edge of the disposal area before dumping the material on top of the existing mound. The contractor would continue to dispose of dredged material on top of the mound until the water was 15-20 feet deep. He would then dump material on the downstream slope of the mound to create an embankment parallel to the shoreline.

A contingency upland disposal site has been identified to provide storage for a portion of dredged material that may, for whatever reason, need to be deposited on a separate upland site. In the improbable event that dredged material may be unsuitable for beneficial use or disposal in-water, it would be isolated at the Joso upland disposal site (RM 56.5 - 56.8), and appropriate confinement measures would be taken to isolate this material (e.g. an impervious liner to prevent leaching of contaminated materials).

2) Future Dredging

For future dredging, including any dredging to be performed in 2001-2002, the primary dredged material disposal option would be coordinated with the Regional Dredging Team (RDT). The RDT would provide an interagency approach to options for management of dredged material including definition of disposal plans agreeable to the public stakeholders and resource agencies. The RDT would consider uses such as creation of aquatic and wildlife habitat, replenishment of beaches, or filling of upland sites.

A Regional Dredging Team (RDT) has been formed to provide input in the development of the Walla Walla District's Dredged Material Management Plan (DMMP), as well as oversight of the plan's implementation (i.e. the dredging and dredged material management activities). The RDT had its initial meeting in July 2000.

The RDT will be asked to develop and recommend appropriate methods for management of dredging and disposal of dredged material from federal navigation and maintenance projects and regulated dredging activities under Section 404 of the Clean Water Act. In the formulation of these management policies, the RDT will be asked to consider key environmental laws and regulations involved in this process, define the responsibilities of other federal, state and local resource agencies, and develop a recommendation process for dredging and dredged material management.

The general objectives of the RDT are to:

- Provide an Interagency Approach
- Define Standard Regulatory Controls
- Establish Sampling and Testing Framework and Procedures
- Facilitate Adaptive Management

- Assist with Development of a Monitoring Plan
- Insure Adherence to Environmental Laws
- Insure Cultural Resource Protections
- Involve Other Groups for Consistency with Local Plans

The first opportunity for the RDT to recommend dredged material disposal methods would be the 2001-2002 dredging, which may include the Schultz Bar area (Plate 15) and the Port of Walla Walla channel at the Boise Cascade plant (Plate 4). The Corps has already identified potential disposal areas for this material. For the Schultz Bar area, the Corps may barge the material upriver to RM 116 and add the sand to the existing underwater embankment. For the Port of Walla Walla channel, the Corps may use the silt to cap upper Shot Rock Island located in the Columbia River just downstream of the mouth of the Snake River and about 9 miles upstream of the port channel (Plate 5). This island was constructed by the Corps in 1985 with rock blasted from the navigation channel in the Snake River. The Corps has been planning to cap the rock with silt to provide a suitable medium for planting trees, shrubs, and grasses, but needed to identify a source of silt. The port channel could provide the needed silt and at a low cost because of the close proximity to the island.

Another potential use of the material from the port channel could be creation of riparian habitat strips as part of a Corps study. The material could be used as a top dressing at various (potential) Corps sites in The Dalles (The Cliffs), John Day (Goodnoe, Plymouth), and McNary (Hood Park) Reservoirs. The dredged material disposal operation could be combined with the efforts of one or two research groups at Waterways Experiment Station, in Vicksburg, Mississippi. One group may be interested in determining economic and biological values for the riparian development and another group may be interested in demonstrating the application of this material as a top dressing composed of sewage sludge, dredged material and other ingredients. The blended material could be fabricated at Boise Cascade or mixed at some distant location such as Plymouth and/or The Cliffs and distributed locally by whatever means is most cost effective.

Because at this time the Corps cannot identify all the disposal areas that would be used for future dredging and disposal events, the Corps proposes to take the following steps for each dredging event:

- Send a notice to parties such as the ports, municipalities, environmental groups, agencies, and others known to have an interest in the beneficial use of dredged material. The notice would provide the location, estimated quantity, dredging method, expected characteristics of dredged material, and estimated time of the dredging event. The notice would precede the proposed dredging event by twelve months to allow time to negotiate an agreement with a local sponsor (if necessary) for the beneficial use of the dredged material.
- Prepare a Biological Assessment for each dredging event.
- Prepare a Clean Water Act Section 404(b)(1) Evaluation for each dredging event.
- Prepare a cultural resources evaluation for each dredging event.

• Publish a public notice about six months prior to the dredging event.

4. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES.

a. Water Quality

The lower Snake River is categorized by the State of Washington as Class "A" excellent waters. For the most of the year, parameters measured to obtain this rating are within the codified State water quality standards with the exceptions of total dissolved gas, temperature, and dissolved oxygen (only when there is heavy sediment loading). The Snake River can at times have an extremely high sediment load. During naturally occurring runoff periods some additional water quality parameters (especially turbidity) are not to standard. The river carries a large sediment load due in part to soil erosion from agricultural practices and other land management upriver. Because the Snake flows through an area of agricultural use with a few industries, the sediments tend to be highly enriched with nitrate and other nutrients. The sediments have small amounts of herbicides and pesticides, low levels of dioxin, and few heavy metals. The water does not have a significant oxygen deficit.

Water quality in the Clearwater River is better than the Snake. There are fewer sources of sediment in the basin, which results in water with a sediment load much less than the Snake River. There are also few sources of contaminants. Discharge of effluent from wastewater treatment plants, and port and industrial facilities may affect water quality.

Ambient water quality in the Columbia River between the confluence of the Snake River and the McNary Dam is classified by Washington State as Class AA waters. The Snake River influences water quality below the confluence as the eastern to southeastern portion of the river tends to have the higher percentage of Snake River water. Water in this portion of the river is higher in turbidity. The turbidity ranges from 5 to 10 NTUs when there is no period of runoff and turbidities as high as 200 NTUs can result in periods where there is heavy runoff. The Snake River water is enriched with nutrients, particularly nitrates from agricultural non-point sources, and thus the southern half of this reach is higher in these constituents as well. The western and northwestern half of the Columbia River receives a majority of its waters from the upper Columbia River. These waters are characteristically low in turbidity with NTUs ranging from 1 to 4 NTUs most often with increases to 100 NTUs during heavy rainfall conditions. The major sources of nutrients and potential contaminants on this portion of the reach are received from the Yakima River. Mixing is not complete in this reach until the water has reached McNary Reservoir. The back currents and slack water tends to mix in the forebay. Regular moderate wind action assists in the mixing action of the forebay. Other parameters such as pH, conductivity, dissolved oxygen and oxidation reduction potential are normal and meet water quality standards for the State of Washington and Oregon. The predominant water quality problem in this reach is

Total Dissolved Gas loading from the Snake and upper Columbia dams and high water temperatures in the late summer months.

1) 2000-2001 Dredging

Information on the types of sediments proposed for excavation in 2000-2001 and the contaminant levels in those sediments has been determined. The Corps took sediment samples from the dredging areas in June 2000 for grain size analysis and contaminant level determination. The results of this analysis are available upon request. The sediment samples from the main navigation channel in the confluence area contain between 85 - 90% sand with 10-15% silt and fines. Sediments at the Lewiston and Clarkston Ports were comprised of more than 90% silt. The boat basins at Willow, Hells Canyon Resort Marina and Swallows and the intake at Hollebeke HMU averaged 56-67% sand and 21-27 % fines. Green Belt boat basin averaged 35% fines and 45% sand. Downstream lock approach sites below Lower Granite and Lower Monumental Dams contained large rock substrate and 1 to 6 inch cobbles.

The proposed 2000-2001 dredging project is expected to have a temporary negative effect on water quality in both the Snake and Clearwater Rivers, mostly because of turbidity plumes caused by the dredging and disposal. The dredging at the ports, in the boat basins, and at Hollebeke HMU are expected to have the most impact as the sediments in these areas are expected to contain fine sediments. The Corps anticipates that dredging operations may create a detectable plume extending up to 1,000 feet downstream. However, operations causing a 5 nephalometric turbidity unit (NTU) increase over background (10% increase when background is over 50 NTU's) at a point 300 feet downstream will not be allowed. This plume would dissipate when dredging ceases for the day or when the dredge is moved to a new location.

The dumping of the dredged material at the disposal sites is also expected to cause turbidity plumes. The plumes are expected to be of short duration as the dumping of a barge is a singular event as opposed to the continuous operation of the dredge. Previous disposal actions have shown that the material tends stay in a clump as it drops from the barge to the riverbed, further minimizing the size of the plume.

In addition to sampling particle size, the Corps had for a series of analyses performed on samples collected in 2000 to determine chemical content of sediments at potential dredging sites in the lower Snake River and the Snake and Clearwater River confluence. Chemical tests included polynuclear aromatic hydrocarbons, organophosphate pesticides, chlorinated herbicides, oil and grease, glyphosate, ampa, dioxin and metal analysis.

Results from herbicide and pesticide tests were below reportable laboratory detection testing levels. Polynuclear aromatic hydrocarbons (PAH's) and metal concentrations were below standards listed for the compounds listed in the Washington Department of Ecology Draft Sediment Standards dated June 1999. For the glyphosphate tests only one site located in the Green Belt Boat Basin at Clarkston showed glyphosate above lab

detection limits at 23 parts per billion. Two other samples for glyphosate in the same boat basin came back below reportable lab detection limits. Two other samples for glyphosate in the same boat basin came back below reportable lab detection limits. This compound is highly soluble and should biodegrade.

Twenty-four sites were sampled for dioxin with dioxin screen tests from the confluence of the Snake and Clearwater downstream for several miles in Lower Granite reservoir. Chlorinated furans and dioxin congeners have been detected in the past in this area (1991, 1996, and 1998). This year's results showed 7 sites to contain some chlorine dioxin congeners. One is at the confluence and four sites are on or near the left bank travelling downstream (river miles 139.1 and 138.4). The seven sites that tested positive on the dioxin screen were tested further with high-resolution gas chromatograph-mass spectrometric methods. Two additional duplicate samples were included. Results showed that there were no concentrations of 2,3,7,8 TCDD, considered a very potent carcinogen, according to Universal Treatment Standards. Less toxic congeners were present in small amounts (parts per trillion)

These congeners were found at all seven sites: Octachlorodibenzodioxin (OCDD) ranging from 8.81-166.94 parts per trillion; 1,2,3,4,6,7, 8-Heptachlorodibenzodioxin (HpCDD) from 1.05-22.15 parts per trillion; 1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF) at 0.29-2.99 parts per trillion; and octachlorodibenzofuran (OCDF) at 0.57-19.61 parts per trillion. 1,2,3,4,7,8-haxachlorodibenzofuran (HxCDF) found at four sites ranged from 0.12-1.15 parts per trillion. 1,2,3,6,7,8-Hexachlorodibenzodioxin (HxCDD) found at two sites ranged from 0.42- 1.21 parts per trillion.

Thirty-eight locations were sampled for oil and grease. Results varied from 41-770 parts per million. Only three of the samples exceeded 400 PPM and they were downstream from boat basins. Total organic carbon (TOC) testing was run on the oil and grease samples and the glyphosate sample that was above detection limits. TOC's for oil and grease averaged 1.2 % and ranged from 0 to 5.8 percent. Total organic carbon for the glyphosate sample was 1.6 percent. These sites all yielded concentrations of PAH chemicals below reportable lab detection limits, oil and grease composition was probably from animal matter.

Dredging the navigation channel downstream of Lower Granite and Lower Monumental Dams should have little effect on water quality as the material to be removed is expected to be river cobble 2-6 inches in diameter with few fines and possibly some larger rock up to 18 inches in diameter. Disposal of this material is also expected to have little impact, but may cause a small turbidity plume. No contaminants are anticipated.

The Corps has prepared a monitoring plan for the 2000-2001 dredging and disposal activities. The Corps would require the contractor to take water samples and measure turbidity using a naphalometer twice per day during active dredging. The contractor would take samples one hour after dredging begins and one hour before dredging ends

each day. Samples would be taken 300 feet upstream from the dredging operation and 300 feet directly downstream from the point of dredging. The contractor would take 2 measurements at each location: 1 meter below the water surface and 1 meter above the river bottom. The contractor would be required to notify the Corps within 8 hours in the event that the turbidity levels measured of the dredging operation exceed allowable levels. These levels are defined as 5 NTU's over background when background is 50 NTU's or less, or more than a 10% increase in turbidity when the background is more than 50 NTU's. Background is measured 300 feet upstream of the dredging operation. The contractor would, immediately upon determining any exceedence of this NTU limit, alter the dredging operation and continue monitoring turbidity at the downstream location until the NTU levels to returned to an acceptable limit above background. If the NTU levels did not return to an acceptable limit, the contractor would stop dredging and wait for the NTU levels to drop before resuming dredging. If the contractor is unable to alter his dredging operation to meet turbidity requirements, he would contact the Corps for further instructions.

The Corps would also conduct monitoring. The Corps would set up YSI Sonde® water quality instruments (self-contained recording devices) to take hourly readings of turbidity, dissolved oxygen, pH, and conductivity. The YSI Sondes would be stationed 300 feet upstream of the dredging operation, 300 feet downstream of the dredge, upstream of the in-water disposal areas, 300 feet downstream of the two shallow/mid-depth disposal sites (one YSI Sonde at each site), and 300 feet downstream of the deep water site. The Corps would download the YSI Sondes daily and analyze the data to ensure water quality standards were being met.

The Corps has prepared a Section 404(b)(1) Evaluation that discusses the impacts of the 2000-2001 dredging on water quality in greater detail. This document is in Appendix A.

2) Future Dredging

The effects of future dredging activities on water quality would depend on the areas to be dredged. If the Port of Walla Walla channel at Boise Cascade and the navigation channel at Schultz Bar are dredged in 2001-2002, the dredging and disposal would be expected to have some impact on water quality. The port channel would be expected to be mostly silt, which would have a greater impact on water quality because it would carry farther in a turbidity plume. It would be also be more likely to have contaminants as contaminants tend to bind with the fine particles that make up silt. The Schultz Bar area would be expected to have less of an impact as the sediments are expected to be mostly sand. The Corps would take sediment samples from these and any other proposed dredging sites to determine grain size and contaminant levels prior to any dredging or disposal.

Any future dredging would also require monitoring for impacts to water quality. It is likely that a monitoring plan similar to the one for the 2000-2001 dredging would be followed.

The Corps would prepare a Section 404(b)(1) evaluation for each future dredging activity.

b. Aquatic Environment

1) Anadromous Fish

The lower Snake River is designated Critical Habitat for migration and rearing of several runs of anadromous fish including Snake River Basin steelhead trout and Snake River spring/ summer and fall chinook salmon listed as threatened under the Endangered Species Act (ESA). McNary reservoir and the other reaches of the lower Columbia River are designated Critical Habitat for migration and rearing of Middle Columbia River steelhead trout listed as threatened under ESA. Remnant runs of endangered Snake River basin sockeye salmon migrate through the project area during the spring and summer. Placement of the dredged material in the shallow/mid-depth site at Knoxway Canyon (RM 116) for fall chinook rearing habitat restoration is expected to be beneficial to salmon. Criteria for beneficial use of dredge material based upon the size of material placed, the depth of placement, and the design developed to reconstruct habitat attributes was developed based upon the research and monitoring recommendations of Dr. David Bennett, a researcher at University of Idaho, who supervises the on-going study of the effects of in-water disposal in Lower Granite reservoir (Bennett et al. 1993a, 1993b, 1995a, 1997a; Curet 1994; Connor et al. 1994; Rondorf and Miller 1994). Discussion on ESA-listed anadromous species lifehistories, use of the project area, and effects of the projects are located below in Section d. Threatened and Endangered Species.

2) Resident Fish

Fish species in the reservoirs of the lower Snake River and McNary dams include a mixture of native riverine and introduced species that typically are associated with lake-like conditions (Bennett et al., 1983; Bennett and Shirer, 1986; Hjort et al., 1981; Mullan et al., 1986). Cold water resident species (such as trout and whitefish) that were once common in the Columbia and Snake Rivers have declined since the construction of the dams and have been replaced by cool and warm water species. Species composition has changed due to the blockage of spawning migrations and modification of habitats (Mullan et al., 1986). The prey base also has changed since the construction of the dams, shifting from dominance of emerging aquatic insects and snails while increasing the availability of crayfish and zooplankton. This shift in prey organisms might also have contributed to the decline of cold-water species (Sherwood et al., 1990).

Resident fish in the reservoirs occupy numerous habitats and often use separate habitats for different life history stages (Bennett et al., 1983; Bennett and Shirer, 1986; Hjort et al., 1981; Bennett et al., 1991). Each reservoir has three general zones which are characterized by different habitats (Hjort et al., 1981). The first zone is the forebay area, which is typically lacustrine (lake like) in nature. At the upper end of the reservoir is a second zone that tends to be shallower and have significant flow velocities. In between these two zones is a transition area that changes in the upstream end from riverine to more lake like in the downstream direction. Each zone can include several habitat types; however most can be characterized as either backwater (including sloughs and embayments) or open-water habitats (Hjort et al., 1981; Bennett et al., 1983).

Backwaters and embayments generally provide low water velocity, slightly warmer water, finer substrate and submersed and emergent vegetation. Backwater areas are used by bass, black crappie, white crappie, bluegill, pumpkinseed, yellow perch, and carp for spawning and rearing (Bennett et al., 1983; Bennett and Shrier, 1986; Hjort et al., 1981; Bennett et al., 1991; Zimmerman and Rasmussen, 1981). The centrarchids normally spawn in shallow water less that 6.5 feet deep (Bennett et al., 1983) while yellow perch generally utilize waters less that 10 feet deep (Stober et al., 1979). Spawning and incubation times vary between species; however, most of these backwater species spawn from May through mid-July (Corps, 1999).

Cyprininds, suckers, walleye, sandroller, and possibly redshiner spawn in open water. White sturgeon (a species that is considered as non anadromous above Bonneville Dam (ODFW and WDFW, 1998)) spawn over areas with rocky bottoms and high water velocity (Parsley et al., 1993). Prickly sculpin spawn in both open water and backwater, based on the distribution of prolarvae (Hjort et al., 1981). The greatest abundance of larvae is generally found in the backwaters and nearshore areas. Only yellow perch and prickly sculpin larvae are commonly found in open-water areas.

Most of the native species spawn in flowing water at the headwaters of the reservoirs or in tributary streams. Some species, however, also spawn in the reservoirs. Northern squawfish (northern pikeminnow) may spawn either in flowing water or along gravel beaches in reservoirs (Wydoski and Whitney, 1979).

Juvenile fish are found in abundance in backwater and open-water areas where flowing water is found. The two habitats are occupied by distinctly different fish species. Introduced species, which are primarily lake-dwelling fishes, are more common in the forebay zone and backwater areas while native species are more common in the flowing water regions found in the tailrace zone (Hjort et al., 1981); Bennett et al., 1983; Bennett and Shrier, 1986; Mullan et al., 1986).

Adult distribution is generally similar to spawning and juvenile distribution, but can change depending upon feeding strategy. Adults may occur throughout the habitats and move seasonally or daily to different areas (Bennett et al., 1983: Bennett and Shrier,

1986; Hjort et al., 1981). Although adults will use various habitats, lake-dwelling species are generally more abundant in shallow, slower velocity backwater areas and native riverine species occurring abundantly in areas with flowing water (Bennett et al., 1983).

Although there is a difference in numbers, there is little difference in the species composition of the five reservoirs. Species found in high abundance in all reservoirs include suckers (bridgelip and largescale), northern pikeminnow, smallmouth bass, chiselmouth, and redside shiners (Bennett et al., 1983; Bennett and Shrier, 1986; Bennett et al., 1988). Species such as crappies, sunfish, and largemouth bass are highly abundant in backwaters of all reservoirs. Minor variations in species composition are related to variations in the availability of backwater habitats and flowing waters in the various reservoirs.

Little Goose, Lower Monumental and McNary reservoirs have a greater number of backwater areas than Lower Granite and Ice Harbor (Bennett et al., 1983). The confluence of two major tributaries (Palouse and Tucannon Rivers) with the Snake River provide additional backwater habitat in Lower Monumental reservoir. These reservoirs tend to support larger numbers of species that depend upon shallow-water habitats during some part of their life histories.

During dredging, impacts on aquatic resources should be minimal. In-water work would occur during the established winter in-water work windows to minimize conflicts with returning adult steelhead and chinook salmon and outmigrating smolts. Resident fish spawning has not been recorded in the reservoirs during the winter in-water work period. At the sites to be dredged, white sturgeon should not be affected as they prefer deeper water with higher velocities upriver of the confluence of the Snake and Clearwater rivers (Lepla 1994). At the dredged material disposal site at RM 116 near Knoxway Canyon some white sturgeon habitat could be effectively displaced by conversion to shallow water habitat more suitable for fall chinook salmon rearing. Benthic invertebrate food sources inhabiting the project area would be displaced and/or overlain by sediment during the dredging and disposal. Monitoring of previous dredged material disposal in Lower Granite Reservoir, under similar sediment conditions, showed that benthic invertebrates rapidly recolonized areas where dredge material was deposited (Bennett et al. 1990, 1993a, 1993b).

Turbidity generated by the proposed action would be diluted within a relatively short period of space and time and should have little effect on primary production. Due to the low ambient water temperatures and localized nature of the plumes, no impacts to beneficial primary productivity are expected. Because the work would be accomplished during the winter, and the turbidity plume would be regulated, no detectable effects to phyto- or zooplankton are expected. Mobile aquatic organisms would likely move out of the immediate area of the proposed dredging and disposal actions, but would return upon completion of the proposed actions.

In the immediate vicinity of the proposed action, short-term turbidity could be high enough to interfere with predation success of vertebrate sight feeders. The disturbance would be limited to the duration of the project. Although the sight feeders may move out of the disturbed area during the proposed event, it is expected they would return upon completion of the project. These interferences, if they occur, would be of limited duration, and would not coincide with any major migration of anadromous fish. Adequate area exists to allow sight feeders to move out of the turbid zone for feeding purposes.

3) Macroinvertebrates

Studies in Lower Granite, Little Goose, and Lower Monumental reservoirs (Bennett and Shrier 1987; Bennett et al. 1988, 1990, 1991, 1993a, 1993b, 1995a, 1997a; Bennett and Nightengale 1996) indicate low diversity in the benthic macroinvertebrate communities that occupy soft substrates (silts, sands, and small gravels). These communities are primarily composed of oligochaete worms and dipteran chironomid fly larvae. Diversity is higher in macroinvertebrate communities that occupy shoreline oriented hard substrate (large gravels, cobble, and boulder, including rip-rap) where tricopteran caddisflies and ephemeropteran mayflies are present with molluscs, primarily Corbicula clams. Many tricopterans are seasonally replenished into the upper reaches of Lower Granite reservoir through drift out of the Clearwater River. Crayfish are relatively abundant with a more cosmopolitan distribution between the rip-rap and across the channel. The benthic communities are expected to be stable and not subject to severe annual disruption.

Benthic invertebrates inhabiting the areas to be dredged would be displaced and/or overlain by sediment during dredging, and a low percentage would be destroyed while most would be transported to colonize the disposal site. Dredged material disposal monitoring in Lower Granite Reservoir showed that benthic invertebrates rapidly recolonized areas where dredged material was deposited. Benthic macroinvertebrate recolonization at the community level should occur within six months to one year through connectivity to adjacent and similar benthic communities and from drifting organisms from upriver sources. However, annual disturbances (associated with natural and/or dredging events) would continue to affect recolonization efforts at some rate depending upon the frequency of events. Any benthic organisms inhabiting the disposal area would be buried by the dredged material. Recolonization should occur rapidly by organisms imported with the dredged material.

The temporary increase in suspended particulates could interfere with feeding mechanisms of certain benthic macroinvertebrates, such as collector species like any tricopteran larvae. However, the short-term impact would be restricted to the immediate vicinity of the work area. This interference would probably be no greater than that occurring during peak runoff in the late spring. Any impacts are expected to be localized and short-term.

With respect to aquatic food web connectivity and function, disturbance and destruction of benthic communities at the proposed dredging and disposal sites may cause local reduction in the available short-term, but seasonal food supply to higher organisms that are resident to the sites. This would displace these resident populations to surrounding water until the food chain is reestablished. The benthic recolonization time period and its impact upon the sites total food web should be negligible.

Should the Joso upland disposal site be needed for disposal of moderately contaminated dredged material, disposal on this site should have minimal impact on the aquatic environment. There would be short-term turbidity generated by the placement of the sheetpile to re-establish docking facilities. Disposal at the site would have negligible effects on aquatic organisms as the dredged material would be placed within containment berms to prevent effluent from re-entering the river.

For future dredging needs after the 2000-2001 dredging, the effects on the aquatic environment would depend on the disposal site. If the Corps, in consideration of the recommendations of the RDT, selects in-water disposal, the effects on the aquatic environment would be similar to those described for the 2000-2001 dredging and disposal, with some site-specific variations. If the Corps selects upland disposal, there would be minimal impact from disposal on the aquatic environment.

c. Wildlife

The lower Snake River and McNary reservoirs provide essential habitat for numerous birds, reptiles, amphibians, small mammals, bats, and big game animals (Asherin and Claar, 1976, Tabor, 1976). Asherin and Claar (1976) identified 87 species of mammals and 257 species of birds that occur in the vicinity of the reservoirs. They generally are dependent on tree-shrub riparian habitat associated with the project reservoirs (Lewke and Buss, 1977). In general, riparian and wetland areas support higher population densities and species numbers than dryland shrub-steppe, talus, cliff, and/or grassland habitat, which are also prevalent along the project reservoirs. Habitats associated with the river generally support trees or dense grass-forb cover that provide more structurally complex areas and more abundant forage resources than adjacent uplands.

Inundation of the lower Snake River and McNary reservoirs following dam construction between the early 1950's and 1975 eliminated nearly half of the woody riparian habitat present along the pre-impoundment rivers (Asherin and Claar 1976). The remaining riparian habitat is now highly discontinuous and dominated by exotic species such as Russian olive. Some riparian habitats have been restored through the establishment of the HMU's. Thus, wildlife generally associated with wildlife habitats tends to be concentrated in these HMUs and in the natural vegetation along the major tributaries, such as the Tucannon, Palouse and Walla Walla Rivers.

The project reservoirs provide food, water, and cover for numerous wildlife species and are especially important in the Clearwater River, lower Snake River and McNary reservoir where moisture is extremely limited. Wildlife that typically uses riparian and wetland habitat area associated with the project areas can be divided into nine main groups: waterfowl, upland game birds, raptors, small mammals, other non game birds, big game animals, furbearers, amphibians and reptiles, and listed threatened and endangered species (Asherin and Claar, 1976; Tabor, 1976).

1) Waterfowl

Over 30 species of waterfowl have been documented to occur on the Columbia and Snake Rivers in the project area (Lewke and Buss, 1977: Asherin and Claar, 1976; Rocklage and Rati, 1998). Resident, breeding waterfowl numbers are generally low except for Canada geese (*Branta canadensis*), mallard (*Anas platyrhynchos*), Barrow's goldeneye (*Bucephala islandica*), and American widgeon (*Anas americana*) which occur throughout the projects. Waterfowl nesting is limited within the lower Snake River reservoirs because of shortage of suitable nesting habitat. Nesting habitat is more readily available adjacent to the McNary reservoir.

Of the four lower Snake River reservoirs, Ice Harbor typically has the most waterfowl (mainly mallard and Canada geese) during migration and winter with a high count of almost 16,000 mallards in December, 1978 (unpublished aerial waterfowl counts by the USFWS and Washington Department of Fish and Wildlife). This may be a result of the Ice Harbor Reservoir being a waterfowl reserve where waterfowl hunting is prohibited. While waterfowl numbers drop off upstream, the diversity of waterfowl increases (USFWS, 1999a).

The McNary reservoir supports a large population of nesting Canada geese (*Branta canadensis*). The 25-plus islands, together with the McNary National Wildlife Refuge and HMUs, annually produce up to 600-700 goslings and provided habitat for nesting ducks, primarily mallards. Most goose nesting occurs on seven islands, with the greatest numbers of successful goose nests on Badger Island.

Canada goose nesting on the lower Snake River and in McNary reservoirs occurs primarily on reservoir islands and along cliffs. Surveys conducted between 1974 and 1987 in the project vicinity have found that over 80 percent of Canada goose production was supported on Badger, Foundation, and New York Islands, producing 280 nests (Boe, 1988). Island nesting on the lower Snake River produced about 125 nests in 1996 (Corps, 1999).

2) Game Birds

The major game bird species occurring in the study area include ring-necked pheasant, California quail, chukar, and mourning dove of which only the mourning dove is native (Asherin and Claar, 1976; Rocklage and Ratti, 1998). These game birds

are relatively common throughout the study area, extending from riverside to the upland areas.

Ring-necked pheasants depend on permanent shrub and tall herbaceous cover that is maintained on irrigated lands in the study area. They are often found on irrigated HMUs foraging on food plots (Corps, 1999).

Chukars use a wide variety of habitats. Oelklaus (1976) found that chukars use Douglas hackberry, smooth sumac, and poison ivy stands along the project area. Shrub and talus areas are important for nesting (USFWS, 1995). Cheatgrass and agricultural grains are important for foraging (Gilbreath and Moreland, 1953; Christensen, 1970).

Of all the game species inhabiting the project area, California quail were most adversely affected by inundation of the dams. Pre-project habitat conditions were ideal for California quail (Sather-Blair et al., 1991) with good interspersion of cropland (food) and riparian vegetation that provided important escape and winter cover. Since completion of the projects, the percentage of project area in food producing cover types (e.g. agricultural crops) has decreased and the distances between food and cover have increased.

3) Raptors

Riparian forests and wetlands along the Snake, Columbia and Clearwater rivers provide perching and nesting opportunities, and concentrated prey (e. g. small mammals, songbirds) (Tabor, 1976; Asherin and Claar, 1976; Asherin and Orme, 1978). In general, cliffs and large trees along rive banks typically support diverse raptor populations. The McNary and lower Snake River reservoirs provide cliff areas in proximity to the rivers that may provide potential nest and roost sites for bald eagle (*Haliaeetus leucocephalus*), golden eagles (*Aquila chrysaetos*) and prairie falcons (*Falco mexicanus*) (Payne et al., 1975; Asherin and Claar, 1976; Tabor, 1976).

Rocklage and Ratti (1998) documented 17 species of raptors in the study area. Asherin and Claar (1976) found only 13 species within the same area, with one species, burrowing owl, not seen in the previous study. During the summer of 1981, Fleming (1981) found a total of 172 raptor nests of 10 species along the Snake River from Lewiston, Idaho, to Ice Harbor Dam. Although nesting information was not specifically recorded, Rocklage and Ratti (1998) recorded 209 raptors of 12 species present along the lower Snake River during the breeding season. Asherin and Claar (1976) found American kestrel (*Falco sparverius*) and red-tailed hawk (*Buteo jamaicensis*) to be the most common raptors in the lower Snake River area.

Peregrine falcons (*Falco peregrinus)* were recently removed from the endangered species list. There are no reported peregrine falcon nests in or near the dredged or dredged material disposal sites. An active aerie is located along Weissenfels Ridge near the confluence of the Snake River and Tenmile Creek, approximately 8 miles south of

Clarkston (USFWS, 1999a). Peregrine falcons could potentially travel through this area during migrations.

A few bald eagles winter along the McNary Reservoir (BPA et. al, 1994). Midwinter bald eagle surveys reported 10 eagles on the lower Snake River (Corps, 1999). They are present in the study area between November and March. These birds are dependent upon waterfowl and fish, as are eagles at the Hanford Reach at the upstream end of McNary Pool.

4) Other Non-Game Birds

The project reservoirs provide essential habitat for numerous colonial nesting birds, shorebirds and songbirds (Asherin and Claar, 1976; Tabor, 1976). They generally are dependent on tree-shrub riparian habitat associated with the project reservoirs (Lewke and Buss, 1977). In general, riparian and wetland areas support higher population densities and species numbers than dryland shrub-steppe, talus, cliff, and/or grassland habitat, which are also prevalent along the project reservoirs. Habitats associated with the river generally support trees or dense grass-forb cover that provide more structurally complex areas and more abundant forage resources than adjacent uplands.

There is some evidence that bird species richness along the project area has declined from pre-impoundment conditions. Of 61 total bird species found by Dumas (1950), 12 were not reported by a more recent study (Rocklage and Ratti, 1998). These species include: black-chinned hummingbird, veery, red-eyed vireo, solitary vireo, American redstart, Brewer's blackbird, and fox sparrow. Most of these species are associated with riparian forest habitat (Smith et al., 1997). It is possible that some of these species are not currently found along the river because of the lack of mature riparian forest and the predominance of exotic species such as Russian olive (USFWS, 1997).

Rocklage and Ratti (1998) observed a total of 92 bird species during the breeding season within the study area. Within the various habitats along the rivers, the HMUs had higher bird species richness during both the breeding season and the fall than the woody drainages leading into the reservoirs. Their narrow width and their degradation may limit the suitability of the woody drainages for foraging and nesting. Therefore, despite the lack of mature riparian habitat on the HMUs, they still provide important habitat for riparian bird species.

California gulls (*Larus atricilla)*, ring-billed gulls (*L. delawarensis*), Forester's terns (*Sterna forsteri)*, Caspian terns (*S. caspia*), and double crested cormorants (*Phalacrocorax auritus*) nest in large concentrations on the lower Columbia River, particularly on Crescent and Foundation Islands along the McNary Pool. Pied-billed grebes (*Podilymbus podiceps*) and rail species use many of the backwater areas throughout the project area. Killdeer (*Charadrius vociferus*) and spotted sandpiper (*Actitis macularia*) nest and forage just upslope from the high pool line and along the

shoreline throughout the project area. In addition, over 1,000 white pelicans (*Pelicanus erythrorhynchos*) typically occur along the lower Columbia River between Boardman, Oregon, to Vernita Bridge, north of Richland, Washington (Corps, 1992).

5) Small Mammals

Eleven small mammal species have been observed in the study area, with two additional species likely present (Corps, 1999). These species include: deer mouse, western harvest mouse, Great Basin pocket mouse, house mouse, long-tailed vole, montane vole, northern pocket gopher, vagrant shrew, Merriam's shrew, bushy-tailed woodrat and Ord's kangaroo rat (Rocklage and Ratti, 1998; Johnson and Cassidy, 1997; Asherin and Claar, 1976). Deer mouse make up the majority of individuals found in the project area. Rocklage and Ratti (1998) found six species, with deer mouse composing 74 percent of total captures. Notably, some evidence suggests that small mammals prefer native riparian habitat to other habitat. Asherin and Claar (1976) found the highest species diversity in their study in the native cattail and shrub willow habitat types.

Six species of bats have been documented in the study area and five more are suspected to occur based on habitat suitability, their range, and their occurrence in the vicinity (Johnson and Cassidy, 1997; Mack et al., 1994; Asherin and Claar, 1976). Documented species include: Yuma myotis, western pipistrelle, pallid bat, small-footed myotis, California myotis, and Townsend's big-eared bat (Asherin and Claar, 1976; Johnson and Cassidy, 1997). Other species of bats that may also be present include: long legged myotis; long eared myotis; fringed myotis; hoary bat and big brown bat (Johnson and Cassidy, 1997; Asherin and Claar, 1976).

6) Furbearers

Aquatic furbearers occur in each of the project reservoirs and include muskrat (*Ondatra zibethicus),* beaver (*Castor canadensis*), river otter (*Lutra canadensis*), and mink (*Mustela vison*). In general, this group is dependent on riverine areas, embayments, ponds, tributaries, and riparian forests for den sites and foraging areas. Beaver distribution within the project reservoirs is strongly associated with the presence of cottonwood and protected areas. (Asherin and Claar, 1976). Muskrats are particularly abundant in embayments and sloughs where aquatic plants are also abundant. Mink and river otter use the project reservoirs, ponds, sloughs, and backwater areas for foraging and denning. Both the mink and river otter use riprap areas along the banks as den sites (Sather-Blair et al., 1991).

Asherin and Claar (1976) observed four species of terrestrial furbearers: bobcat, coyote, raccoon, and striped skunk and the three species of aquatic furbearers discussed above. They concluded that aquatic furbearer abundance was low along the lower Snake River. Asherin and Claar (1976) also noted that that the aquatic furbearers were

more abundant in those study segments with more extensive riparian habitat such as the McNary National Wildlife Refuge.

Although it is likely that some of these species were never abundant (Asherin and Claar, 1976), inundation by the reservoirs probably eliminated much of the riparian habitat that was important for foraging and denning for many of the furbearers. In particular, muskrat and mink seem to have declined (WDG, 1984; Corps, 1999).

7) Big Game Mammals

Mule and whitetail deer are the most common big game inhabiting the study area (Tabor, 1976). Mule deer make up about 80 percent of the deer population with the whitetail deer making up the remaining 20 percent. Populations of deer have recovered to pre-impoundment carrying capacity (Corps, 1990). This increase is at least partly due to the development of habitat in HMUs and the exclusion of livestock from much of the study area (Corps, 1999).

Suitable habitat for deer in the study area mainly serves as wintering range, with the deer making seasonal and daily migrations out of the canyons to forage in the surrounding cultivated land. Deer use a wide variety of habitats including shrub and brush for cover and fawning and grassland for foraging.

Mule deer are found in increasing numbers from the Lower Monumental pool upstream to the upper half of the Little Goose pool (Tabor, 1976; Ackerman, 1999). There is some evidence that greater precipitation and higher habitat diversity along the upper two lower Snake River reservoirs provide more stability for deer populations than habitats downstream and extending into the McNary reservoir (Corps, 1990).

Other species that have been observed along the river but that are considered uncommon include: elk, bighorn sheep, black bear, moose and mountain lion (Corps, 1999)

8) Amphibians and Reptiles

Sixteen species of amphibians and reptiles have been documented in the study area (Asherin and Claar, 1976); Loper and Lohmann, 1998; McKern, 1976). The most commonly occurring species were the Pacific tree frog (*Hyla regilla*), bullfrog (*Rana catesbeiana*), western yellow-bellied racer (*Coluber constrictor mormon*), Great Basin gopher snake(*Pituophis melanoleucus deserticola*), long-toed salamander*(Ambystoma macrodactylum*), western toad (*Bufo boreas*), night snake(*Hypsiglena torquata*), western rattlesnake (*Crotalus viridis*) and painted turtles (*Chrysemys picta*). Other species that may occur within the study area, but were not observed by Asherin and Claar (1976) or Loper and Lohmann (1998) include: tiger salamander(*Ambystoma tigrinum*), northern leopard frog (*Rana pipiens*), short horned lizard (*Phrynosoma*

douglassi), sagebrush lizard (*Sceloporus occidentalis*), rubber boa (*Charina bottae*), and the ringneck snake (*Diadophis punctatus*).

Of the vegetation types sampled by Asherin and Claar (1976), the ones most closely associated with water had the greatest relative abundance of amphibians. In particular, native willow and emergent wetland habitats has the greatest species diversity. In general Loper and Lohmann (1998) found that species richness and abundance were low at both riparian and upland locations. Some of the reasons may include the relative young age of the recovering riparian fringe beside the existing reservoirs; the isolation of suitable riparian habitat into discrete patches along the river (i. e. HMUs) and fluctuating water levels in the reservoirs that prevent the consistent occurrence of litter, debris, pools, and vegetation that these species could use for breeding, resting and forage (Loper and Lohmann, 1998).

9) Impacts of Dredging and Disposal

Dredging and disposal actions in 2000-2001 within and adjacent to the river would not prevent wildlife, primarily waterfowl and raptors, from obtaining food from adjacent areas. No trees would be removed, therefore, streamside and shoreline perch trees would not be impacted. Waterfowl, fish, and other wildlife would use the areas above and below the sites where dredging and disposal activities occur. The dredging and disposal activities would not be a continuous activity confined to a single location. Waterfowl, fish, and other wildlife would return to the activity areas shortly after completion of the project. Waterfowl would continue to be able to use the site after disposal is completed as there would be no loss in surface water area with the underwater disposal.

Similarly, aquatic furbearers that occur at or near the dredging or disposal site vicinity have not been adversely impacted by past dredging and disposal activities. They have been and would continue to be deterred from using the sites during the dredging, transport, and disposal activity but would continue to use adjacent areas during dredging/disposal activities.

Other mammals, such as mule deer, would not be impacted by dredging or in-water disposal since there would be no impacts to existing uplands.

If the Corps needed to use the Joso upland disposal site for moderately contaminated dredged material, the impacts to wildlife would be moderate. The barge facility for off-loading the dredged material would be located at the west end of the site. Wildlife and waterfowl using this area would be displaced from the barge facility area when it is in use. Disturbances caused by noise and general activity during disposal activity may cause more sensitive species to abandon the site. Depending upon the quantity of material requiring disposal, upland habitat could be lost. However, initially the material would be placed in the quarry area, which is largely devoid of vegetation and receives minimal use by wildlife. Because the dredged material would be covered with

topsoil and seeded to native grasses, disposal at Joso could have a positive effect on wildlife by providing vegetative cover where none exists now. Upland disposal at Joso is expected to have a direct, long-term, moderate impact on terrestrial wildlife.

The effects of future dredging events would depend on the disposal site selected. Continued use of in-water disposal sites to create shallow-water habitat for salmonids would likely have minimal impact on wildlife species. Use of upland disposal sites could have positive or negative effects. For example, using dredged material to cover riprap along the shoreline to create riparian areas would provide additional wildlife habitat. However, using dredged material as fill at ports could convert wildlife habitat to and industrial use site. The Corps and the RDT would include wildlife concerns when recommending disposal sites for future dredging.

d. Threatened and Endangered Species

The following fish, wildlife, and plant species, listed as either endangered or threatened, may be found in the project area:

- Snake River sockeye salmon (*Oncorhynchus nerka*) – Endangered
- Snake River Spring/Summer-run chinook salmon (*Oncorhynchus tshawytscha*) – Threatened
- Snake River fall chinook salmon (*Oncorhynchus tshawytscha*) – Threatened
- Snake River Basin steelhead (*Oncorhynchus mykiss*) - Threatened
- Middle Columbia River steelhead (*Oncorhynchus mykiss*) – Threatened
- Bull trout (*Salvelinus confluentus*) – Threatened
- Bald eagle (*Haliaetus leucocephalus*) – Threatened
- Ute ladies' tresses (*Spiranthes diluvialis*) – Threatened
- Spaulding's silene (*Silene spaldingii*) - Threatened

The Corps has determined the proposed dredging and disposal for 2000-2001 "*May Affect, But is Not Likely to Adversely Affect*" these species. The Corps has prepared two Biological Assessments (BA's) documenting this determination. The BA sent to the National Marine Fisheries Service (NMFS) documents the effects on anadromous fish (Appendix B), while the BA sent to the U.S. Fish and Wildlife Service (USFWS) documents the effects on non-anadromous fish, terrestrial wildlife, and plants (Appendix C). The Corps is awaiting concurrence with its determination from both agencies.

The Corps is unable to determine the impacts of future dredging and disposal on listed species as the disposal areas have not yet been determined. The Corps will prepare BA's and consult with USFWS and NMFS each year that dredging is proposed.

The project area of the Snake River is designated critical habitat for migration and rearing of all three Snake River salmon ESU stocks (December 28, 1993; 58 FR 68543) and for Snake River Basin steelhead (February 16, 2000; 65 FR 7764). McNary reservoir and the other reaches of the lower Columbia River are designated Critical

Habitat for migration and rearing of Middle Columbia River steelhead trout listed as threatened under ESA. In designating critical habitat, NMFS considers the following requirements of the species: (1) space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, or rearing of offspring; and, generally, (5) habitats that are protected from disturbance or are representative of historical geographical and ecological distributions of the species.

In addition to these factors, NMFS also focuses on the known physical and biological features (primary constituent elements) within the designated area that are essential to the conservation of the species and that may require special management considerations or protection, termed Essential Fish Habitat (EFH) pursuant to the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. 1801 *et seq.* These essential features may include, but are not limited to, spawning sites, food resources, water quality and quantity, and riparian vegetation (50 CFR 424.12(b)), and can be generally described to include the following: (1) juvenile rearing areas; (2) juvenile migration corridors; (3) areas for growth and development to adulthood; (4) adult migration corridors; and (5) spawning areas. Within these areas, essential features of critical habitat include adequate: (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) safe passage conditions. Adjacent riparian area is defined by NMFS as the area adjacent to a stream (river) that provides the following functions (components of Properly Functioning Habitat (PFH) or Properly Functioning Condition (PFC)): shade, sediment transport, nutrient or chemical regulation, streambank stability, and input of large woody debris or organic matter.

Section 9 of the ESA makes it illegal to "take" a threatened or endangered species of fish. The definition of "take" is to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 U.S.C. 1532(19)). NMFS interprets the term "harm" in the context of habitat destruction through modification or degradation as an act that actually kills or injures fish.

The following paragraphs summarize the use of the project area by these species and the expected impacts of the 2000-2001 dredging on listed species.

1) Anadromous Fish

a) Endangered Species

Snake River Sockeye Salmon (*Oncorhynchus nerka*)

The proposed actions should pose relatively no affect on the Snake River sockeye salmon stock productivity or Critical Habitat, because no individuals of this stock should be present in the Snake or Clearwater rivers during the winter in-water work window of December 15, 2000 through March 1, 2001, because this stock uses

the proposed dredge areas only as migration corridors. This evolutionary significant unit (ESU) is comprised of a stock with an upriver spawning lifestyle that uses accessible lakes in the Salmon River subbasin for spawning and rearing, therefore no individuals should utilize the dredge activity areas of the Snake or Columbia rivers during the winter of the designated in-water work period for rearing, feeding, or over-wintering.

Wild adult sockeye salmon pass through the project area between late June and August. Juvenile sockeye generally migrate downstream during April and May. The first adult sockeye salmon are not counted at Bonneville Dam until mid-May (Corps Annual Fish Passage Reports 1991-1999).

Designated Critical Habitat and Essential Fish Habitat (EFH) for potential rearing or over-wintering for Snake River sockeye salmon are not present in the lower Snake River or the proposed project area. The components of designated Critical Habitat and EFH for juvenile and adult migration passage are present between mid-March and mid-June. No spawning habitat for sockeye salmon is present in the proposed project area.

In the event that sockeye salmon production should increase, the passage dates for adult sockeye salmon would be similar based upon historical trend data. In addition, there should be no effect on individuals of these stocks through alterations of critical habitat caused by dredging, because these stocks would continue to use the proposed dredge areas only as migration corridors.

Snake River sockeye passage timing and Critical Habitat attributes found in proposed dredging removal and disposal areas not addressed above in the lower Snake River and McNary reservoir of the lower Columbia River would be similar to those discussed above for the 2000-2001 dredging actions. Dredging actions in lower river locations would have less effect than similar actions performed in the upper reaches of the lower Snake River because sockeye would be physically more mature and experienced in passage behavior as they approach the lower river, no sockeye should be present or near the proposed action areas during the in-water work window, and sockeye do not use lower Snake or lower Columbia river shoreline or pool habitats to overwinter, but use the rivers more exclusively as migratory corridors.

b) Threatened Species

Snake River Fall-run Chinook Salmon (*Oncorhynchus tshawytscha*)
Snake River Spring/Summer-run Chinook Salmon (*Oncorhynchus tshawytscha*)
Snake River Basin Steelhead (*Oncorhynchus mykiss*)
Middle Columbia River Steelhead (*Oncorhynchus mykiss*)

The Snake River supports spring/summer and fall chinook salmon, listed as threatened in April, 1992, and steelhead, listed as threatened on October 17, 1997. The

wild adult chinook salmon runs consist of overlapping migrations of spring, summer, and fall races in the project area during April through December, with wild spring chinook occurring April through mid-June, wild summer chinook occurring mid-June through mid-August, and wild fall chinook occurring mid-August to spawning in the river above Lower Granite reservoir by mid-December. Adult wild Snake River fall chinook salmon migrate through the Snake River from late summer to early winter with spawning activity not beginning until mid-October (Connor et al. 1994). Wild juvenile spring chinook typically pass March through mid-June, wild summer chinook typically pass May through July, and wild fall chinook typically pass mid-June through September, with double peaks in mid-July, and some lingering proportion of the annual migration population lasting until December.

Juvenile Snake River fall chinook salmon tend to outmigrate as subyearlings during their year of emergence over a period of weeks or months, feeding and growing as they progress downriver (Bennett et al. 1997a). Many of the juvenile fall chinook salmon outmigrating from the Clearwater and Snake rivers spend time in shallow, open-water shoreline areas (<3 meters in depth) in Lower Granite and downriver reservoirs, where they prefer sand-substrate areas (Curet 1994, Bennett et al. 1997a). When water temperatures reach about 18 degrees Centigrade, these fish achieve adequate growth and fitness due to the warming up conditions of these shallow water habitat areas and leave the shoreline areas to either continue rearing and/or begin their migration in the cooler pelagic zone of the reservoirs (Bennett et al. 1997a).

Placement of the dredged material in the shallow/mid-depth site near Knoxway Canyon to reconstruct rearing habitat attributes is expected to be beneficial to salmon. Criteria for beneficial use of dredge material based upon the size of material placed, the depth of placement, and the design developed to reconstruct habitat attributes was developed based upon the research and monitoring recommendations of Dr. David Bennett, a researcher at University of Idaho, who supervises the on-going study of the effects of in-water disposal in Lower Granite reservoir. Dr. Bennett's team has found that sediments consisting of at least 80% sand 0.21 mm in diameter or larger is the preferred substrate for juvenile salmon. A depth of 20 feet to define the boundary between mid-elevation depth and shallower water was determined based upon typical limits of the photic zone conducive for primary and secondary productivity of food web constituents, as well as preferred depths of open sandy bench habitat important for juvenile fall chinook rearing (Bennett et al. 1993a, 1993b, 1995a, 1997a; Curet 1994; Connor et al. 1994; Rondorf and Miller 1994).

Very few of the EFH components that existed along the shoreline of the lower Snake River reservoirs have been modified or eliminated in the recent past due to previous maintenance dredging, where other associated human activities and economic growth along the shorelines have resulted in some modification of habitat that introduced additional needs for dredging. The two EFH components that may have been potentially influenced by confluence dredging in the past are (2) juvenile migration corridor and (4) adult migration corridor, specifically the essential features of (1)

substrate, (2) water quality, (7) food, as in macroinvertebrate production, and (10) safe passage conditions. Adjacent to the footprint boundary for dredging in the confluence is a critically important (1) juvenile rearing area for fall chinook salmon in the embayment of Wilma. The existing open, sandy, shallow water rearing habitat within Wilma remains protected from modification of any bathymetric feature that would be due to proposed dredging, therefore not affected by the dredging proposed to occur in the mainstem channel. Dredging activities will be confined to the in-water work window when no or very few salmonids would be migrating or requiring premigration rearing, so exposure to short-term increases in turbidity should not exist. Dredging is not allowed at elevations below the existing channel bottom contours because removal of input sand and silt is the target, hence native substrate classes of cobble and gravel suitable for spawning should not be affected. It has been routinely shown that macroinvertebrates displaced by dredged material removal aid in colonizing or supplementing existing populations at the in-water disposal sites and that the populations at the removal site become recolonized relatively rapid depending upon season (Bennett et al. 1990, 1991, 1993a, 1993b, 1995a, 1995b; Bennett and Nightengale 1996), both influenced through the mechanism of drift.

The EFH components that may be potentially influenced by dredging in the boat basins or their approaches from the main channel are (1) juvenile rearing areas, (2) juvenile migration corridors, and (4) adult migration corridors; specifically the essential features of (1) substrate, (2) water quality, (5) water velocity, (7) food, as in macroinvertebrate production, and (10) safe passage conditions. Boat basins and HMU water intake basins fill with fine substrate dominated by silt that is not suitable substrate preferred by salmonids. High use by recreational boat traffic can limit their suitability for salmonid rearing. Dredging activities will be confined to the in-water work window when no or very few salmonids would be migrating or requiring premigration rearing, so exposure to short-term increases in turbidity should not exist and removal of unsuitable size classes of substrate should not have a negative effect. These areas will be dredged by mechanical means to virtually eliminate the possibility of entrainment of any juvenile salmonid that may be present. Water velocities will not be affected since these areas are functionally shallow water back eddies more suitable for resident fish. Macroinvertebrates displaced by dredged material removal can aid in colonizing or supplementing existing populations at the in-water disposal sites and that the populations at the removal site become recolonized relatively rapid depending upon season. An additional concern with the substrate quality removed from boat basins that have not been dredged in a number of years is the potential for the accumulation of contaminants bound in the silt as a result of spillage from fueling or other activities, or brought downriver to settle in the lower velocities of the backwater eddy environment. Recent sampling in these basins indicate that concentrations of contaminant indicators are below the level that would eliminate their disposal in-water. In the event that a pocket of visually contaminated sediments is hauled up in the clamshell or bucket, the Corps would direct that such an area would be classified and investigated as Hazardous Waste and deposited in a truck for removal to an appropriately established waste disposal site.

The EFH component that may be potentially influenced by dredging in the lock approaches of Lower Granite and Lower Monumental dams are (5) spawning areas, specifically the essential features of (1) substrate, (5) water velocity, (6) cover/shelter, and possibly (7) food, as in macroinvertebrate production. Prior to dredging, these areas will be surveyed for redds according to established protocol (Dauble et al. 1995) to determine if modifications to velocity and substrate could cause salmon to avoid these areas for spawning. If redds are found and verified, then location and duration of dredging will be modified to accommodate avoidance and protection of any verified redds.

The Corps believes that additional maintenance dredging contained entirely within the previously disturbed footprint with the confluence of the Snake and Clearwater rivers would not degrade the suitability of that habitat for Snake River spring/summer and/or fall chinook salmon, and/or Snake River Basin steelhead, thus not adversely modifying Critical Habitat or EFH components of that Critical Habitat. This is because the area is used primarily as a migration corridor for all lifestages of these stocks and migration of each lifestage of each stock has terminated for the year, with the exception of potential for utilization of the submerged shallow water for rearing and feeding by fall chinook and some adult migration by B-run steelhead to upriver tributaries to hold for spawning in the following spring. None of the known or potential areas used by fall chinook for rearing will be disturbed by any dredging action.

No adult individuals of Snake River fall chinook salmon stock should be present at the confluence of the Snake and Clearwater rivers in late-December 2000, or January and February 2001. These fish migrate to the Snake and Clearwater rivers from late summer to early winter, and all spawning activity should be completed by mid-December (Connor et al. 1994). Habitat from Snake RMs 148.3 to 246.5 are annually surveyed for fall chinook salmon redds through December by the US Fish and Wildlife Service FRO in Ahsahka, ID (A. Garcia memo, 1999). No spawning habitat is present in the proposed dredge areas, except the possibility of limited fall chinook spawning in the adjacent tailrace areas of Lower Granite and Lower Monumental dams (Dauble et al. 1998, Kenney 1992). Garcia et al. (1986-1999) found no evidence of fall chinook salmon spawning in or near Snake River miles below RM 144. The nearest redd location was a single redd in 1990 at Snake RM 148.3 (Ten Mile Range No. 1). Although juvenile Snake River fall chinook salmon are spawned and rear in the Snake and Clearwater rivers above the proposed dredging sites (Connor et al. 1994), the low velocity and relatively fine substrate input to the upper reaches of Lower Granite reservoir preclude spawning in the confluence area. Spawning of fall chinook salmon has been known to occur in Little Goose, Lower Monumental, and Ice Harbor reservoirs, but only in tailwater areas of the dams near the water discharging influence of bypass outfalls, where water velocity is high and substrate size is relatively large (Dauble et al. 1995, 1996).

Dredging proposed to occur within the tailwater downriver of the navigation lock guidewall of Lower Granite and Lower Monumental dams could affect up to 10 to 12 redds with low probability that such redds will be constructed based upon previous surveys (Dauble et al. 1999). In these locations, predominately cobbles that have rolled in since the 1996-97 and 1998-99 dredging activities due to high spring flows would be removed. Cobbles are preferred spawning substrate for mainstem spawning Snake River fall chinook. These areas are located within the 14 foot designated navigation channel. The Lower Granite lock approach was dredged in 1997-98 and the Lower Monumental lock approach was dredged in 1998-99 during the respective in-water work windows. No redds have been located in the areas downriver of the navigation lock approaches at Lower Granite or Lower Monumental dams since November, 1991 (Kenney, 1992, Dauble et al. 1995, 1996, 1999).

Wild Snake River fall chinook salmon typically outmigrate as subyearlings in the spring and summer of their emergence year. Based on the typical Snake River fall chinook salmon outmigration pattern, few or no juvenile chinook salmon should be present in the confluence of the Snake and Clearwater rivers or the previously dredged tailwater area immediately below the Lower Granite or Lower Monumental navigation lock guide walls during the dredging period of December 15, 2000 through March 1, 2001. No adult individuals of Snake River fall chinook salmon stock should be present at the confluence of the Snake and Clearwater rivers in late-December 2000, or January and February 2001. These fish migrate to the Snake and Clearwater rivers from late summer to early winter, and all spawning activity should be completed by mid-December (Connor et al. 1994). Habitat from Snake RMs 148.3 to 246.5 are annually surveyed for fall chinook salmon redds through December by the US Fish and Wildlife Service FRO in Ahsahka, ID (A. Garcia memo, 1999). No spawning habitat is present in the proposed dredge areas, except the possibility of limited fall chinook spawning in the adjacent tailrace areas of Lower Granite and Lower Monumental dams (Dauble et al. 1998, Kenney 1992). Garcia et al. (1986-1999) found no evidence of fall chinook salmon spawning in or near Snake River miles below RM 144. The nearest redd location was a single redd in 1990 at Snake RM 148.3 (Ten Mile Range No. 1). Although juvenile Snake River fall chinook salmon are spawned and rear in the Snake and Clearwater rivers above the proposed dredging sites (Connor et al. 1994), the low velocity and relatively fine substrate input to the upper reaches of Lower Granite reservoir preclude spawning in the confluence area. Spawning of fall chinook salmon has been known to occur in Little Goose, Lower Monumental, and Ice Harbor reservoirs, but only in tailwater areas of the dams near the water discharging influence of bypass outfalls, where water velocity is high and substrate size is relatively large (Dauble et al. 1995, 1996).

On the other hand, PIT-tag detections of 1993-95 brood year fall chinook salmon from the Clearwater River were recorded in the spring of 1994-96 at some lower Snake River dams (Personal Communication between Bill Arnsberg, Nez Perce Fisheries, and Dan Kenney, Walla Walla District Corps of Engineers, June 18, 1996). It is unknown whether these fish overwintered in the free-flowing Clearwater River or in one or more

of the lower Snake River reservoirs. It is apparent from these detections that some Clearwater River fall chinook salmon migrate to the ocean as yearlings, rather than as subyearlings, possibly due to stunted growth rates in the late summer and early fall from cold water releases from Dworshak dam aimed at augmenting flows for adult immigration. The Corps is unaware of information on the extent of overwintering of juvenile fall chinook in the Clearwater River, but has no reason to believe that overwintering in the area of the proposed dredging is a common occurrence or behavior. If any juvenile fall chinook salmon are in the confluence area during the proposed activities, the Corps believes that they would be sufficiently agile and aware to avoid the dredging equipment. Also, suspended sediment concentrations downriver of the dredging should be well below the level that would cause mortality (Bennett and Shrier 1986, Newcombe and Jensen 1996).

Although the majority of the substrate to be removed by dredging within the confluence and each boat basin and HMU and their approaches is sand (the preferred shoreline substrate for rearing subyearling chinook salmon) the highest proportion of substrate remaining on the river bottom would remain sand because the depth of the incoming sediment exceeds the limits of the dredging depth.

The Corps believes that most lifestages of the Snake River fall chinook salmon stock would be unaffected or benefited by enhancing shallow water rearing habitat structure along the shoreline immediately upriver of Knoxway Canyon, where mid-depth water would be raised to at least a shallow-water elevation at around 10 - 20 feet (Plate 32). The resultant acreage of open, sandy shallow water habitat should result in increased diversity of physical habitat attributes and number of forage species preferred by rearing subyearling chinook salmon while simultaneously decreasing habitat suitable for rearing of predator species on salmonid smolts, such as smallmouth bass and Northern pikeminnow.

In addition, the Corps has determined that most lifestages of the Snake River fall chinook salmon stock would be unaffected by habitat alteration at the confluence, again because habitat-dependent early lifestages do not typically occur at the dredge areas in the confluence due to the impacted nature of the bathymetry from multiple years of previous dredging activity back to the late-1970s and because of the migratory nature of the occurrence of use by juvenile and/or adult fall chinook.

The proposed actions would not affect Snake River spring/summer chinook salmon stocks, because no individuals of these stocks should be present in the Snake or Clearwater rivers during the winter in-water work window of December 15, 2000 through March 1, 2001. No adult Snake River chinook salmon are typically counted at Lower Granite Dam until March (Corps Annual Fish Passage Reports 1991-1999). In addition, there should be no effect on individuals of these stocks through alterations of critical habitat caused by dredging, because these stocks use the proposed dredge areas only as migration corridors.

Adult Middle Columbia River and Snake River Basin steelhead migrate through McNary reservoir and the lower Snake River between June and November. Wild adult steelhead migrate between June and August for the A-run and between late August and November for the B-run. Wild adult Snake River Basin B-run steelhead migrating to the Middle and South Forks of the Salmon River for spawning in March through May may be present in the mainstem channel of the lower Snake River adjacent to the project area during the time of dredge activities. Adults from this stock may be migrating in deeper water or individuals may be holding in midchannel pools prior to moving upriver into tributaries for spawning in early spring. These fish would likely be sufficiently aware and agile to avoid the dredging equipment and move away from the low concentration turbidity plumes of short-duration caused by the suspension of sediment (Newcombe and Jensen 1996). Suspended sediment concentrations downriver of the site should be very similar to background NTU measurements collected upriver and well below the level that would cause direct mortality and would be of short enough duration (pulses lasting less than 12 hours per day) to not cause delayed physiological effects (Bennett and Shrier 1986, Newcombe and Jensen 1996).

The turbidity plume may temporarily discourage steelhead from moving upriver. However, by the time the dredging operation begins in mid-December, the peak of the steelhead fishing season should have passed. In 1996, the peak of the fishing season was in November to early December. Therefore, the dredging operation should have a minor impact on Snake River Basin steelhead.

Other life-stages of Snake River Basin steelhead should not be present at the confluence during the proposed dredging period. Juvenile steelhead migrate downstream through the area between late March and the end of August. In-water work will take place between December 15 - March 1 to minimize conflicts with returning adult steelhead and chinook salmon and outmigrating smolts.

Critical Habitat in the mainstem lower Snake River designated for Snake River Basin steelhead overlaps that designated for Snake River spring/summer chinook salmon. The effects on habitat components such as EFH are addressed above in the chinook salmon discussion.

Snake River chinook salmon and steelhead passage timing and Critical Habitat attributes found in proposed dredging removal and disposal areas not addressed above in the lower Snake River and McNary reservoir of the lower Columbia River would be similar to those discussed above for the 2000-2001 dredging actions. Except for slight variations for Snake River fall chinook, Snake River Basin steelhead, and Middle Columbia River steelhead, dredging actions in lower river locations would have less effect than similar actions performed in the upper reaches of the lower Snake River because chinook salmon and steelhead would be physically more mature and experienced in passage behavior as they approach the lower river, few chinook salmon and steelhead should be present or near the proposed action areas during the in-water work window, and spring/summer chinook salmon do not use lower Snake or lower

Columbia river shoreline or pool habitats to overwinter, but use the rivers more exclusively as migratory corridors.

In McNary reservoir the critical components for salmon and steelhead are access into the Walla Walla River for late-fall/winter run Middle Columbia River steelhead during November through December, which could be affected by the turbidity plume and its deposition of suspended sediment, and the high use of the extensive fall chinook salmon rearing habitat along the north shore Shotrock Islands area including Casey Pond of Burbank Slough. The existing shallow water habitat is suitable for Snake River fall chinook and unlisted Hanford fall chinook salmon, and current documentation suggests that the majority of this habitat is utilized by the Hanford stock (Easterbrooks 1995, 1996, 1997, 1998). Although this rearing area is above the Port of Walla Walla approach channel to the Boise Cascade paper products plant that is proposed for dredging, the Corps has not yet designated a disposal site other than a suggested proposal to the RDT to cap Shotrock Islands with the silts that will dominate the material composition to be removed.

Any perceived negative effects to increasing water temperature effects on aquatic biota has to be put into the context of the biological requirements of invertebrates for their production as prey for rearing fall chinook salmon presmolts. The presmolts must attain sufficient growth and fitness to successfully smoltify and survive outmigration. A sufficient warming period measured in degree days within the range of temperatures for optimal metabolism and production for fall chinook presmolts is currently provided in north Casey Pond during mid-March and mid-June. Water temperature dynamics in north Casey Pond do not appear to be a critical limiting factor for fall chinook survival. In north Casey Pond Fall chinook salmon abundance is relatively low and seasonally restricted compared to adult and juvenile warmwater, but non-native species (Easterbrooks, 1995, 1996, 1997, 1998). As the water temperature increases, fall chinook presmolts feed and grow rapidly until they reach about 8-10 cm total length, smoltify, and begin their downriver migration before the water temperature reaches near 70 degrees F. North Casey Pond provides adequate rearing habitat in the spring from mid-March through mid-June. The highest abundance of fall chinook salmon juveniles occurs between mid-April and mid-May when water temperatures range between 57 and 68 degrees F. At these temperatures conditions are most optimal for rapid growth of chinook salmon juveniles (Easterbrooks, 1995, 1996, 1997, 1998).

The most significant human practices affecting conservation efforts for Middle Columbia River steelhead stocks inhabiting the Walla Walla River which confluences with the lower Columbia River a short distance downriver from the Port of Walla Walla approach channel to the Boise Cascade paper products plant that is proposed for dredging is the seasonal lack of water (personal communication, Jon Germond, Oregon Department of Fish and Wildlife, August 25, 1999). During the summer and fall the Walla Walla River can become nearly dry at upstream diversion sites due to irrigation withdrawal contributing to the increased area of the silt-laden delta at the mouth of the Walla Walla River. Excessive turbidity input from upriver dredging of the Port of

Walla Walla channel at the Boise Cascade paper products plant many effect increasing the size of the Walla Walla River delta through deposition of the increased suspended sediment. This may act to narrow the window of time and physical access area in the spring and late fall for sub-basin migrations of anadromous Middle Columbia River steelhead and resident fish, such as bull trout. Decreased water elevations may seasonally degrade water quality by concentrating any pollutants that may be present and by decreasing the buffering effect that acts to moderate the rate of increasing temperature.

2) Non-Anadromous Fish and Terrestrial Species

a) Endangered Species

None

b) Threatened Species

Columbia River Basin Bull Trout (*Salvelinus confluentus*)
Bald Eagle (*Haliaetus leucocephalus*)
Ute Ladies' Tresses (*Spiranthes diluvialis*)

(1) Bull trout

Bull trout are native inhabitants of most major river drainages in the Pacific Northwest. They are widespread throughout the Columbia River Basin, including occupation of many tributaries to the Snake River. Populations have declined throughout the area due to human impacts. Habitat components that appear to influence bull trout distribution and abundance include water temperature, cover, channel form and stability, valley form, spawning and rearing substrates, and migratory corridors (Oliver, 1979; Pratt, 1984, 1992; Fraley and Shepard, 1989; Goetz, 1989).

Bull trout are strongly influenced by temperature (Brown 1992). In general, water temperature above 15°C (59°F) is believed to limit bull trout distribution (USFWS 1998 citing Fraley and Shepard 1989). Brown (1992 citing Allan 1980 and Shepard et al. 1984b) reports spawning streams rarely exceed summer temperatures of 18°C. Temperature at redds during spawning (August through November) is typically between 4 and10°C (39-51°F) (USFWS 1998 citing Goetz 1989, Pratt 1992, and Rieman and McIntyre 1996). Adult bull trout may be more temperature tolerant during migration, having been found migrating and staging in 20 to 24°C water (Brown 1992 citing Kraemer, WDW Mill Creek, WA, pers. comm.).

Spawning occurs from August to November in slow-moving streams that are higher in elevation in the subbasin located off tributary streams to the lower Snake and Columbia rivers. Redds are often constructed in stream reaches fed by springs or near other sources of cold groundwater. Spawning substrate consists of loose, clean gravel

relatively free of fine sediments. Eggs incubate for 100 to 145 days, and fry remain in the substrate for an additional 60 to 100 days. Side channels, stream margins, and pools with suitable cover are important habitats for juvenile fish.

Adult bull trout may either be resident or migratory. Resident bull trout complete their life cycle in the stream in which they spawn and rear, often moving to downstream pools with adequate cover to overwinter (Jakober 1995) from approximately November through May. Migratory bull trout spawn in tributary streams, where juvenile fish rear one to four years before migrating to either a lake (adfluvial), river (fluvial), or saltwater (anadromous). Migratory bull trout frequently begin migrating to spawning grounds in April, remaining there through the fall and returning to the lake or river to overwinter.

Winter habitat requirements for migratory bull trout have not been well described. Brown (1992, citing Goetz 1989, Allan 1980, and Kraemer 1991) describes fluvial populations of bull trout overwintering in deep pools or lower reaches of mainstem rivers. Jakober (1995) found bull trout overwintering in deep beaver ponds or pools containing large woody debris and suggested the importance of cover and temperature at overwintering sites.

Major tributaries to the Snake River below the Hells Canyon Dam that support bull trout include: the Tucannon River, the Clearwater River, Asotin Creek, the Grande Ronde River, the Imnaha River and the Salmon River. Of these, the Tucannon is the only tributary with clear evidence of individual bull trout migrating to the mainstem Snake River in the project area (USFWS 2000). There have been several observations of adult bull trout passing Lower Monumental and Little Goose dams. From 1994 to 1996, there were 27 bull trout passing the adult fish counting station (mainly in April and May) at Little Goose Dam. At least six bull trout passed counters at Lower Monumental and Little Goose dams in 1990 and 1992 (Kleist 1993). Kleist also observed one bull trout in 1993 just downstream of the count window at Lower Monumental dam, and one bull trout was captured in the Palouse River below Palouse Falls in 1998. These were likely migratory fish from the Tucannon River (USFWS 2000) overwintering in the Snake River or its reservoirs. One bull trout was observed at Lower Granite dam in 1998 that may indicate fluvial fish are migrating to other upstream populations. Little is known about how bull trout use these areas during winter. A bull trout was also seen passing Ice Harbor Dam in 2000, which was probably from the Tucannon River. Adfluvial bull trout would likely use the deep pools of the reservoirs, seeking out colder water and hiding habitat. The selection of foraging habitat would likely be based on the location of prey (mainly concentrations of smaller fish).

The status of bull trout associated with the Tucannon River was rated as "healthy" by Washington Department of Fish and Wildlife (1997), although some habitat degradation has occurred due to timber harvest and recreational use. It is not currently at risk of extinction, and is not likely to become so in the foreseeable future because of

sufficient habitat protection (wilderness designation) in the upper watershed and the lack of brook trout encroachment from Pataha Creek. The Pataha Creek subpopulation is at risk of extinction as a result of habitat degradation and competition and hybridization from brook trout.

The Clearwater and Grande Ronde Rivers also have populations of bull trout that could potentially migrate to the project area; however, evidence suggests that this is rare, and the potential to impact these populations through activities in the lower Snake River is extremely small (USFWS 2000).

Migratory bull trout from the Tucannon River may be present at dredging and dredged material disposal sites below the Lower Granite Dam during the proposed window of operation. It is less likely that bull trout would be present in the vicinity of the confluence of the Snake and Clearwater rivers where most of the dredging would take place. The potential for small numbers of bull trout to be present at either location, however, necessitates the discussion of possible impacts.

Dredging will be completed using mechanical means, primarily by means of a clam shell. Due to the characteristics of this equipment, it is unlikely that the dredging would cause direct mortality to fish. Specifically, the clamshell bucket descends to the substrate in an open position. The force generated by the descent drives the jaws of the bucket into the substrate, which "bite" the sediment upon retrieval. During the descent the bucket remains in an open position, and thus would be unlikely to trap or contain fish.

There is potential for the dredging operation to displace fish from the immediate dredging area. Fish are known to respond evasively to a variety of stimuli (Popper and Carlson 1998). The noise of the tugboat engine pushing the transport barge may cause any bull trout present to leave the dredging area. The disturbance caused by the mechanical dredge as it enters the water and removes material will also tend to cause any bull trout present to leave the dredging area. Except in the very shallow disposal sites, the sudden stimulus of the nose or shock wave associated with the release of the dredged material, or the sudden decrease in light, would be expected to startle fish and induce them to dart away from the source (Anderson 1990). The ability of fish to move away from the disturbance prevents them from being harmed directly by the dredging, but has potential to cause excess energy expenditure and loss of habitat use.

Dredging and disposal would cause temporary and localized impacts by increasing turbidity and suspended solids. Background turbidities in the lower Snake River reservoirs range from 10 to 200 NTUs, depending on rainfall and runoff R. Heaton, U.S. Army Corps of Engineers Walla Walla District, personal communication). Van Oosten (1945) concluded from a literature survey that average turbidities as high as 200 NTUs do not harm fish. In the winter, during dry weather, background turbidity is expected to be at the low end of this range. The contractor will be required to monitor turbidity levels up and downstream of the operation. Operations causing a 5 NTU

increase over background (10 percent increase when background is over 50 NTUs) at a point 300 feet downstream will not be allowed.

In light of potential impacts to anadromous fish, the Corps has implemented dredging policies that require the use of mechanical dredging equipment. Grab, bucket, or clamshell (mechanical) dredges, as proposed for this project, provide little or no potential for fish to become entrained or harmed. The Corps has used mechanical dredging on the District since 1987 and will continue to do so.

Measures to minimize turbidity would be taken. Contractors would be required to monitor turbidity levels and will not be allowed to cause increases of more than 5 NTUs over background levels or 10 percent when background is over 50 NTUs.

Dredging and disposal operations in 2000-2001 would occur during a time of year that bull trout may be present in the lower Snake reservoirs. Numbers of bull trout in the vicinity of the dredging operation are likely to be small, and the potential for fish to avoid impacts is high. Conservation measures would be taken to minimize the impacts of dredging equipment and turbidity. Thus, the Corps has determined that the dredging and disposal *operations may affect, but are not likely to adversely affect* bull trout.

Future dredging and disposal actions would be expected to have similar impacts to bull trout. Potential impacts to bull trout would have to be taken into consideration when selecting in-water disposal sites. Upland disposal may have little effect on bull trout.

(2) Bald eagle

During the nesting season (February 1 through August 15), bald eagles use breeding habitat close to rivers, lakes, marshes, or other food sources. Important habitat components include nest trees, perch trees, and available prey. Live, mature trees with deformed tops are often selected for nesting, and nests are often reused year after year. Snags, trees with exposed lateral branches, or trees with dead tops are important for perch-sites while hunting or defending territories. Perches used for foraging are normally close to water where fish, waterfowl, seabirds, and other prey can be captured. Nest locations are usually in fairly remote river and lake sections, especially when new nesting areas are colonized. As nesting colonies grow, the eagles will become more tolerant of human activities in and around the nest.

There are no reported bald eagle nests within 20 miles of any work site in the project area. The closest nests are two first year attempts (2000). One is near the mouth of the Snake River (RM 1) on Strawberry Island. The other was on Dworshak Reservoir on the North Fork Clearwater River. Both of these nests were unsuccessful. The nearest successful nesting occurred about 80 miles south of Clarkston on the reservoir above Hells Canyon Dam. Since most of the lower Snake River lacks large cottonwoods and other large tree species near the shore there is very little suitable

nesting habitat in the project area. The Strawberry Islands or areas upstream of the mouth of the Clearwater River are the closest areas with good nesting potential.

Wintering season for eagles runs from November 1 through March 15. Wintering bald eagles congregate along rivers, lakes, and streams, where winter runs of salmon provide an abundant prey base. Waterfowl concentrations is also an important winter food source. In eastern Washington, mixed stands of black locust and black cottonwood provide important roosting and perching habitat. Waterfowl and carrion provide a high percentage of their diet in this region.

Based on data from Corps mid-winter surveys, bald eagles may be present in the project area during the winter but at very low numbers. Mid-winter censuses have been conducted on the Lower Snake and Columbia Rivers from the McNary Dam (on the Columbia below the confluence with the Snake) to Asotin, WA (2 miles upriver from Clarkston) annually since 1989. These surveys generally take place in January and are divided into two survey areas. The Western Project survey area extends from McNary Dam to the Lower Monumental Dam. The Eastern Project area extends from Lower Monumental Dam to the upper influence of the Lower Granite Reservoir, near Asotin, WA. Surveys were typically conducted in January and were confined to Corps-managed lands along the rivers. No communal night roosts have been found on the lower Snake River by biologists.

The last five years of survey results were summarized to show average annual bald eagle occurrence. In the Western Project area, bald eagle counts ranged from 11 to 19 individual birds annually. Most of these individuals were seen on the McNary Pool. Lower Snake River numbers below Lyon's Ferry have been between 1-5. In 1997 and 1998, a single adult bald eagle was seen at Lost Island Habitat Management Unit, one of the two proposed dredged material disposal sites. In January 2000, an adult bald eagle was observed perched on a rock bluff at the downstream end of Windust Park, 1.5 miles from the Lower Monumental Navigational Approach dredge site.

In the Eastern Project area, between three and five individual bald eagles per year have been counted. One or two of these are usually found in the Snake/Clearwater confluence area, the others have been sighted on the Tucannon River (SR 62) and at Moses HMU (SR 129.5) in the Lower Granite reservoir, approximately nine miles downstream from the confluence of the Snake and Clearwater Rivers.

The eagles tend to congregate in areas of waterfowl concentrations. These areas are usually associated with a waterfowl food source. These are usually at grain loading facilities on the river or recently harvested crop fields. Grain loading terminals are found at Sheffler (SR 29), Windust (SR 38.2), Upstream Lower Monumental Dam (SR 42), Lyon's Ferry (SR 61), Central Ferry (SR 83.5), Almota (SR 104), Port of Whitman (SR 135.2-136.5), Port of Clarkston (138.4), and Port of Lewiston (CR 1.5). Other areas can attract waterfowl for loafing and resting. These are usually associated with HMUs along the river that may have some pastures and backwater areas. These

areas (especially the irrigated sites) will also have trees large enough to support perching eagles. Irrigated recreation areas can also provide this type of habitat.

Due to the timing of the project and lack of nesting activity in the project area, the dredging and disposal activities will not impact nesting bald eagles. There is limited use of the project area by wintering bald eagles; however, potential for disturbance of wintering eagles does exist. Human activities occurring near perching or foraging eagles may cause them to temporarily leave the area.

The majority of the dredging will take place at the Snake/Clearwater confluence area. Eagles wintering in this area are habituated to daily human activity. Fishing boats and barge traffic generate noise and human disturbance on a daily basis. Dredging is less likely to impact bald eagles in a setting where human disturbance already exists.

On the Lower Snake, near the Upper Granite and Lower Monumental dredge sites, an average of two barges pass the locks daily. Dredging operations would increase human activity and noise levels over these existing background levels. A grain loading facility on the Snake River just west of the confluence with the Clearwater often attracts waterfowl, which in turn may attract bald eagles. Dredging at the confluence has potential to disrupt both the eagles and the waterfowl.

Due to the potential for disturbing wintering eagles, a wildlife biologist will conduct surveys at dredge or dredge disposal sites, which have the highest potential for eagle presence, immediately prior to the commencement of activities at that site. Activities will not commence while bald eagles are using the project area. This applies to eagles that are within 0.25 miles when out of line-of-site of the activity and within 0.5 miles when in line-of-site of the activity. The dredging sites which have the lowest potential for bald eagle presence are Lower Granite Dam and Willow boat basin. All other sites listed in Table 1 will be surveyed for eagle presence. The disposal areas at Knoxway canyon and down stream of Lost Island both have a very low potential for bald eagle presence. This is due to the fact there is no habitat or waterfowl attractants within ½ mile of either of these sites. Although an eagle was seen at Lost Island HMU, the habitat which would attract eagles is over ½ mile upstream of the proposed disposal site. Knoxway Canyon is on a very remote section of the river, upstream of Lower Granite Dam. No HMUs or grain loading facilities are within 2 miles of this site. Lower Granite Dam is in a remote section of the river with no habitat for bald eagles and no grain loading facilities or developed HMUs within 2 miles of this structure. The activity on the dam itself acts as a deterrent to eagles.

Due to the conservation measures that will be implemented to avoid disturbance to roosting or foraging eagles, the 2000-2001 dredging and disposal *may affect, but is not likely adversely affect* bald eagles.

Future dredging and disposal activities would be expected to have similar impacts on bald eagles. The Corps would need to monitor dredging and disposal for eagle presence prior to initiating dredging and disposal activities. In-water disposal would likely have little impact on bald eagles. Upland disposal may affect bald eagles and eagle usage of potential upland sites would have to be evaluated prior to selecting the sites for disposal.

(3) Ute ladies' tresses

This orchid is a lowland species, typically occurring beside or near moderate gradient medium to large streams and rivers in the transition zone between mountains and plains. It is not found in steep mountainous parts of the watershed, nor along slow meandering streams out in the flats. It occurs in a variety of settings, including: floodplains; moist to wet meadows on floodplains, abandoned meander channels, moist to wet meadows irrigated by freshwater springs, riparian streambanks, borrow pits, upper edges of river banks, islands, point bars, and various topographic positions up to 200 feet horizontally and 0.5-4 feet vertically from water's edge, but not on steep slopes (USFWS, 1998b). The communities where it is often found tend to be typical of riparian habitat in the area. The species tend to occupy graminoid (grasses, rushes and sedges) dominated openings in shrubby areas. It occasionally occurs in spring-fed wetlands in broad valleys isolated from watercourses. Soil moisture must be at or near the surface throughout the growing season. The species tolerates periodic flooding, but does not occupy constantly inundated areas (USFWS, 1998b).

Ute ladies' tresses was discovered in Washington for the first time in 1997. It was also found in the Snake River Basin in southeastern Idaho in 1996. It is now known to be present in northern Washington, southern Idaho and nearby parts of Montana. The USFWS has determined that, in the absence of adequate surveys, this species may be expected to occur in suitable habitat throughout Idaho and Washington (USFWS 1998b). There are no known occurrences in the project vicinity.

The proposed 2000-2001 dredging and dredge disposal would take place within the river channel and would not impact habitats suitable for Ute's Ladies' tresses. Because this project would not effect suitable habitat for Ute's ladies' tresses, the Corps has determined there will be "*no effect*" on this species.

The impact of future dredging and disposal activities would likely depend upon the disposal site selected. In-water disposal would likely have no effect on this plant species. However, upland disposal sites, especially riparian areas, would have to be evaluated for their potential as Ute ladies' tresses habitat.

c) Species Proposed for Listing

Spalding's Silene (*Silene spaldingii*)

Spalding's silene occurs primarily within open grasslands with a minor shrub component and occasionally with scattered conifers. It is found most commonly in the Idaho fescue/snowberry plant association at elevations of 1900 - 3050 feet. These sites are typically dominated by Idaho fescue and have sparse cover of snowberry. Some of these sites occur in a mosaic of grassland and ponderosa pine forest. Populations have been found on all aspects, although there seems to be a preference for slopes which face north. On drier sites, the species can be found on the bluebunch wheatgrass/Idaho fescue association. Associated species include prairiesmoke (*Geum triflorum*), sticky geranium (*Geranium viscosissimum*), Wood's rose (*Rosa woodsii*), white stoneseed (*Lithospermum ruderale*), yarrow (*Achillea millefolium*), northwest cinquefoil (*Potentilla gracilis*), and hawkweed (*Hieracum sp.*).

Spaulding's silene generally occurs in native grasslands that are in reasonably good ecological condition, although populations have persisted in areas that have had moderate grazing pressure. Populations tend to be quite small and are currently quite fragmented, raising questions about their longterm viability. Fire may have historically played a role in maintaining habitat, particularly in sites that are interspersed with ponderosa pine forest.

There are no known occurrences of Spaulding's silene in the project area. Because none of the proposed activities would take place within suitable habitat for Spaulding's silene, the Corps has determined this project will have *no effect* on Spaulding's silene.

The impact of future dredging and disposal activities on this plant would likely depend upon the disposal site selected. In-water disposal would likely have no effect. However, upland disposal sites would have to be evaluated for their potential as Spaulding's silene habitat.

d) Species of Concern

Any other aquatic species of concern which may be affected by this project are also migratory or mobile species with critical habitat requirements or timing needs for migration of lifestages passing through the mainstem lower Snake River. Care in construction timing and activities will be taken to insure these species are not inadvertently harassed, injured, or killed during the dredging and disposal activities.

The following species of concern are listed by the USFWS and may occur in the vicinity of the proposed project:

Pacific lamprey (Lampetra tridentata)
River lamprey (Lampetra ayresi)
Westslope cutthroat trout (Oncorhynchus (= Salmo) clarki lewisi)
White sturgeon (Acipenser transmontanus)

Anadromous populations of these species would also be of concern to NMFS, several tribes, and the WDFW, and could be included under the purview of NMFS

and/or USFWS ESA review responsibilities. Analysis of effects could assist in preclusion to future listings under ESA. These species and their stocks are predominantly mainstem or tributary life-forms. Of these species or their stocks, only White sturgeon have been widely documented to use the mainstem of the lower Snake River and the confluence of the Clearwater and Snake Rivers for rearing, feeding, or overwintering. No spawning habitat is present in the proposed project area for any of the species No Designated Critical Habitat and EFH have been established by NMFS or USFWS for these species and/or their stocks. Pacific lamprey juveniles may have a minimal likelihood of being present in the proposed project area. Habitat suitable for lamprey rearing may also be present, although the degree of suitability is relatively unknown. No documented use of any habitat type by Westslope cutthroat trout has been recorded for backwaters of the Snake River. White sturgeon prefer depths down to 60 feet deep and associated velocities for all lifestages. Care is taken not to create shallow water habitat overtopping an adequate mid-depth bench or deep water zone known to be suitable for white sturgeon.

Snake River populations of these species and their passage timing and suitable habitat attributes and distribution that would be found in proposed dredging removal and disposal areas that were not addressed above in the lower Snake River and McNary reservoir of the lower Columbia River would be similar to those discussed above for the 2000-2001 dredging actions. Except for slight variations for blocked or restricted reservoir populations of white sturgeon, dredging actions in lower river locations would have less effect than similar actions performed in the upper reaches of the lower Snake River because the current information for these species indicate that few individuals of these populations should be present or near the proposed action areas during the in-water work window, although it is possible that lamprey could use lower Snake or lower Columbia river shoreline or pool habitats to overwinter, instead of exclusively as migratory corridors.

5) Cumulative Effects on Aquatic Species

Indirect effects, interdependent effects, or interrelated effects would likely not be significant due the existing human impact regime and based upon over 10 years of data and experimentation compiled by Dr. David Bennett and associated University of Idaho research and monitoring on the suitability of created rearing habitat compared to the suitability and critical components of paired reference sites. Dredging of boat basins and access to such basins should provide little increased use in the number of net recreational boats or commercial boating ventures. Since the depth of the navigation channel and all access channels remains relatively shallow at 14 feet for shallow draft vessels, it is anticipated that very few deeper draft vessels would be capable of utilizing the areas dredged.

The proposed dredging project is the latest in a continuing series of dredging operations to maintain navigation, port, and recreational use of the lower Snake, Clearwater, and Columbia Rivers. The Corps anticipates that dredging will continue to

be needed in the confluence area to remove accumulated sediment and should have a Dredged Material Management Plan (DMMP) EIS coordinated, reviewed, and completed in the summer of 2001. A Regional Dredging Team (RDT) for the lower Snake River and McNary reservoir was formed in July 2000 to coordinate and review future dredging needs, priorities, and activities, especially options for beneficial use disposal. The studies conducted by Dr. Bennett indicate there may be beneficial uses of the dredged material in the reservoir if certain criteria are followed in the selection and placement of the material.

6) Conclusion

The Corps prepared biological assessments (BA) of the effects of the proposed dredging project on the listed stocks and determined that the proposed action would not adversely affect individuals of the listed stocks. The Corps provided this information to NMFS as informal consultation requirements under Section 7 of the ESA (Appendix C) and is awaiting a response from that agency. Based on the above information and additional discussion in the BA, it was determined that the above described actions *"May Affect, But Are Not Likely To Adversely Affect"* individuals of Snake River sockeye, spring/summer chinook, or fall chinook salmon, and/or Snake River Basin steelhead ESUs, or act to jeopardize their continued existence through acting to preclude their survival or recovery through potential adverse modification of rearing and migration components of their Critical Habitat. This determination is based on all work being performed within the designated in-water work window of December 15th through March 1st which minimizes the effects on migrating or rearing salmon and steelhead that should not be present during the winter work window. The dredged material removal and disposal activities and their by-products, such as short-term turbidity plumes, should be easily avoidable by either juvenile or adults of any listed salmonid stock that would be either rearing or migrating within the mainstem Snake River. The dredging activities by non-hydraulic techniques should be harmless. The Corps also believes that the disposal activity adding to increase the area of the mid-elevation bench associated with Knoxway Canyon would not adversely affect critical habitat for the listed stocks of Snake River chinook and sockeye salmon or Snake River steelhead, and should be beneficial to Snake River fall chinook salmon juvenile rearing through increasing available, suitable, and functional habitat in open sand with increased macroinvertebrate production. Some white sturgeon habitat could be effectively displaced by conversion to shallow water habitat more suitable for fall chinook salmon rearing.

e. <u>Cultural Resources</u>

Cultural resources are the collective remains of past human activities that represent the tangible elements of former cultural environments. In the absence of comprehensive oral traditions, written documentation and ethnographies, they present opportunities to learn about past peoples and how they lived. In addition, they may also possess qualities which are culturally valued at the community, regional or even national level. The cultural resources of the lower Snake and middle Columbia rivers

provide a rich source of information concerning past human lifeways and human adaptation to environmental changes.

Within the lower Snake and mid-Columbia river drainage, cultural resources encompass a time span of over 12,000 years of history and prehistory. The kinds of cultural resources found in this area include prehistoric/ethno-historic open camp sites, housepit villages, rock art, lithic quarries and workshops, cemeteries, individual burials, and rock cairns. Historic period sites include the remains of farms, settlements, and transportation and water diversion systems. Knowledge of the location and nature of these cultural resources is largely the result archaeological surveys, testing, and data recovery done prior to the construction of dams and reservoir impoundments.

Under Section 106 of the National Historic Preservation Act, all federal agencies are required to take into account the effects of their undertakings (i.e. projects) on cultural resources included in or eligible for nomination to the National Register of Historic Places (NRHP). Cultural resources sites are listed or determined eligible for listing on the NRHP through an evaluation process to determine if sites meet identified NRHP requirements (36 Code of Federal Regulations Part 60). Also included in the Section 106 process is the requirement that federal agencies enter into cultural resources consultation with appropriate "consulting parties" (e.g. Indian tribes, local governments, State Historic Preservation Offices, etc.) for each proposed undertaking. Federal agencies must complete their Section 106 requirements prior to going forward with proposed undertakings.

Within the identified project area (i.e. McNary, Ice Harbor, Lower Monumental, Little Goose, and Lower Granite reservoirs), there is a total of 617 known cultural resource sites, most of which are now inundated. They include the full range of site types mentioned above. Currently, four individual sites and four archaeological districts (a group of cultural resource sites) from within the five reservoirs are listed on the NRHP. Efforts are presently underway to determine the NRHP eligibility of those remaining sites still accessible for assessment.

For the duration of the proposed interim dredging and disposal project, there is the potential for cultural resources to be affected. Specific impacts could result from cultural materials being removed during dredging operations or their being buried by silt, sand and cobble dredged materials during in-water disposal. The quantities of applied dredge materials over any given cultural property could cause compaction, displacement, and even losses in the preservation of cultural materials and features important to scientific research. Burial of archaeological sites for their protection is a viable alternative to scientific excavation. However, the complex reaction between site soils and cultural materials require that the design and construction of a protective resource covering needs to be favorable to the preservation of subsurface cultural deposits. The objective is not to stop the deterioration rate of cultural materials, but rather to not contribute further to their loss. In order to determine if in-water disposal

actions would adversely affect a cultural property, the nature of cultural deposits and project affects must be assessed.

For 2000-2001, areas clear of known cultural resources sites have been selected for dredging and disposal actions. Based on available information, it is not anticipated that the proposed work will impact cultural resources. The District is therefore making a "no historic properties affected" determination and will seek concurrence and project clearance. The necessary project information has been provided to identified consulting parties which include the Idaho and Washington State Historic Preservation Offices, the Colville and Umatilla Tribal Historic Preservation Offices the Nez Perce Tribe, the Yakama Indian Nation, and the Wanapum Indian community.

Impacts to cultural resources from future dredging and disposal activities cannot be determined at this time. Until specific locations are known, it will not be possible to identify if cultural resources are present or if they will be impacted by the proposed work. Because of this situation, each yearly dredging/disposal event will require a Section 106 review.

f. Recreation

The lower Snake and Columbia Rivers provide an important recreational resource for the region. There are 68 designated recreation sites located on the shores and adjacent areas of the Columbia and Snake Rivers between McNary Dam on the Columbia River and the upstream end of Lower Granite reservoir on the Snake River. These facilities include wildlife refuges, local and state parks, and marinas, and are managed and operated by the Corps, the U.S. Fish and Wildlife Service, and local and state recreation agencies. Many of these facilities are identified on Plates 1 through 17.

Recreational activities take place throughout year, with the highest activity levels during the fair-weather periods of late spring, summer, and early autumn. Due to the setting of recreational facilities, most recreation is related to the water resources presented by the Snake and Columbia rivers. Boating, swimming, and fishing are common activities, as are camping and day-use activities such as picnicking, hiking, and wildlife observation. Water-dependant activities, such as fishing and boating, take place during the same months that dredging is planned (December through February), however at generally lower activity levels than in spring and summer months, although steelhead fishing activities are highest in the autumn months.

Dredging and in-water disposal actions are expected to have a minor, short-term effect on those recreation activities and facilities located near proposed dredging and disposal locations. Dredging activities may temporarily close boat ramps and boat basins and affect public recreation areas (swimming beaches) on a short-term, temporary basis during maintenance dredging. Effects would be minor due to low levels of activities that occur during the winter months for which dredging and disposal are proposed. Beneficial uses that would create or enhance fish and wildlife habitat

would have indirect beneficial effects on recreation if they enhanced hunting, fishing, or wildlife viewing opportunities.

One type of recreational activity, steelhead fishing, could be affected by the proposed dredging actions. Steelhead fishing is a popular recreational activity in the confluence area. The steelhead season in this area extends from June through March in Washington and from September 15 to April 15 in Idaho. There is come concern that the turbidity plume caused by the dredging may discourage steelhead from moving upriver or may discourage fishermen from trying to catch steelhead. However, the number of steelhead passing over Lower Granite Dam usually decreases by the third week of November (personal communication, Steve Pettit, Idaho Department of Fish and Game, September 17, 1997). In 1996, the peak of the season in the Clarkston area was November - early December (Personal communication, Jim Buck, Clarkston Resources Office, September 12, 1997). In recent years, the steelhead season has been winding down by the first of January. Because dredging would not start until December 15, the peak of the steelhead season should have passed prior to the start of dredging. Also, the allowable increase in turbidity close to the dredge operation would be low relative to the natural variations in background turbidity (See Section 4.a.). Therefore, the dredging operation should have a minor impact on recreational steelhead fishing.

Dredging could affect general recreational fishing and boating in the confluence area. Dredging in the Greenbelt Boat Basin would preclude use of the boat ramp in the basin. Fishermen and boaters would have to use a different boat ramp to launch and take out their boats. Dredging in the boat basin would be accomplished as quickly as possible to minimize the closure period of the boat basin. Fishermen and boaters would have to be alert to the presence of the dredge and the barges on the river. The contractor would be instructed to be alert for boaters when operating the dredging equipment and moving barges. The Corps plans to publicize the dates of the proposed dredging operations to alert fishermen and boaters.

Upland disposal activities at the Joso site would have long-term, indirect effects on river users, hunters, and the nearby Lyon's Ferry State Park and Lyon's Ferry Marina facilities. These effects are not anticipated to be significant as the disposal area is set back at least 300 feet from the river shoreline, and is not directly visible from Lyon's Ferry State Park and Lyon's Ferry Marina, which are located on the opposite side of the Snake River.

Upland disposal activities at the Joso site would have long-term, indirect effects on river users, hunters, and the nearby Lyon's Ferry State Park and Lyon's Ferry Marina facilities. These effects are not anticipated to be significant as the disposal area is set back at least 300 feet from the river shoreline, and is not directly visible from Lyon's Ferry State Park and Lyon's Ferry Marina, which are located on the opposite side of the Snake River.

g. Socio-Economics

The socio-economic effects of implementing a long-term plan for maintaining the navigation channel in the lower Snake River and McNary reservoirs would be seen primarily within the communities along the river system that are, in some way, involved with commercial river navigation. Broader economic effects stem from the movements of commodities outside the study area.

Several socio-economic factors such as population, employment, income, and resource uses and users for the study area have been considered. The estimated 1998 population of all the counties in the study is 405,995. This represents a 14.6 percent increase from the 1990 population, with only Garfield County, Washington, experiencing a small decrease in population. The study area is generally rural in nature with the Tri-Cities (Washington) area, near the confluence of the Snake and Columbia Rivers, and the Lewiston, Idaho/Clarkston, Washington area, near the confluence of the Clearwater and Snake Rivers, being the main population centers in the study area.

Study area counties have shown generally higher annual growth rates in the 1990s than in the 1980s, or in the case of some counties, lowered rates of population decline. In the 1980s, the region's growth rate lagged behind the overall growth rates of the states of Washington, Idaho, and Oregon (17.77 percent, 6.65 percent, and 7.95 percent, respectively), due in large part to the rapid growth of the more heavily populated urban areas in these states during the same time

Within the study area, total county non-agricultural employment was highest in Benton County, Washington, which is the most populous and highly urbanized county in the study area. Correspondingly, non-agricultural employment totals were lowest in rural counties with low populations (Columbia and Garfield counties in Washington).

Per capita incomes in the study area counties are generally consistent with or higher than state-wide per capita incomes for their respective states. Estimated income-based 1995 poverty rates within the study area counties range from a low of 8.7 percent in Benton County, Washington, to a high of 17.0 percent in Umatilla County, Oregon.

The Columbia and Snake River systems provide a variety of resources for public and private uses that help to form the foundation of the regional economy of the study area. These uses include: transportation, logging, agriculture, industry, electric power, and recreation (Corps, 1992). In the study area reaches of the Columbia and Snake Rivers, key uses include: transportation, power generation, industrial uses, and recreation.

Barges use the reservoirs to transport commodities produced in the study area (and beyond) to downstream markets and trans-shipment points. Similarly, some products such as chemicals are transported via barge upstream to final or interim users. Water-borne, navigation-based commerce depends on the maintenance of the authorized channel through the lower Snake River and McNary reservoirs.

The proposed navigation maintenance dredging on the Snake and Columbia Rivers would maintain the integrity of the barge transportation system serving the study area. Navigation on the Snake and Columbia Rivers has historically provided an important route of access into and from the interior Columbia and Snake River basins. Commercial traffic operates on the Columbia River from its mouth through the Tri-Cities area in Washington. On the Snake River, commercial traffic uses the waterway from its confluence with the Columbia River at Pasco, Washington, to Lewiston, Idaho. The federal government, through the Corps, operates and maintains the congressionally authorized navigation channels and locks throughout the navigable waterway of the Columbia and Snake Rivers.

Port facilities at Clarkston and Lewiston have histories of siltation, which occurs because of the changes in river flow as the Snake River and Clearwater River enter the pool formed behind Lower Granite Dam. River current velocity decreases as it enters the pool, dropping large amounts of sediment. Maintaining water depths has been most critical on the south side of the river at Clarkston and to a lesser extent at Lewiston. Facilities on the north bank downstream of the Clearwater-Snake confluence have reported few problems.

On the McNary pool, eddies and other conditions cause marginal water depths at some facilities, especially downstream of Clover Island. These depths have continued to cause docking problems for grain and short-term storage elevators in the Tri-Cities area. Other facilities with marginal water conditions at the present are located at Burbank and Wallula.

The Columbia /Snake River waterway serves an enormous area that covers much of the western United States. Agriculture dominates the regional industries associated with waterborne commerce. Trade revolves around grains, primarily wheat, alfalfa, corn, grass seed, fruits, and vegetables, with wheat being the largest export item. Other regional industries that use water transportation include aluminum, pulp and paper, petroleum, logs, lumber, and beef. Products shipped on the shallow draft channel are comprised mainly of wheat, grain, wood products, logs, petroleum, chemicals, and other agricultural products. Containerized commodities are also transported via the waterway. Containers are typically loaded at Lewiston and Pasco with approximately 97 percent of these shipments destined for Portland and the remainder going to Vancouver, Washington. Petroleum and fertilizer products have historically made up the bulk of upriver barge shipments on the waterway (Corps, 1995). The forecast of barge shipments over the Columbia and Snake River Waterway above McNary Dam is presented in Table 3-7. Typically, a "barge shipment" is comprised of one four-barge raft and a tow, which can transport 14,000 tons of grain or other bulk commodities.

The proposed dredging project would have a positive effect on socio-economics even though it would have no effect on regional population, employment, or income.

Dredging would have a long-term beneficial impact on river navigation by insuring adequate depths in the navigation channels, access channels to ports and moorages and public recreation areas. For 2000-2001, materials would be disposed of in each pool in shallow and mid-depth areas away from areas of commercial and recreational river navigation. Dredging in the navigation channels would occur on average on a two-year cycle causing some disruption in the in-water work period from December 15 to March 1 in the Snake River and December 1 and March 30 in the Columbia River. Dredging in the access channels to ports and moorages would occur on an as-needed basis. Disruption would be minimized through notification to mariners and processes that avoid blocking busy waterway segments for periods longer than one or two days. Barges used to transport dredged material would traverse only the reservoir where the material was dredged, and not impact lock utilization. No disruption to recreational boating would be expected in the main river channels; only short-term disruption may occur during maintenance dredging of boat basins.

For future dredging, disposal may be in-water or upland. Future in-water disposal sites would need to be sited away from commercial and recreational river navigation and would have similar impacts to socio-economics as the 2000-2001 dredging. Upland disposal would be unlikely to affect navigation. If upland disposal is used to create industrial sites or provide material for manufacturing (e.g. a composting facility) that could create additional jobs, the impacts could be considered positive for socio-economics.

h. Cumulative Effects

The proposed dredging project is the latest in a continuing series of dredging operations to maintain navigation, port, and recreational use of and irrigated wildlife habitat along the lower Snake, Clearwater, and Columbia Rivers. The Corps anticipates that dredging will continue to be needed in certain areas because their location and/or configuration make them susceptible to sediment deposition. Dredging of these areas would occur on a periodic basis ranging from once every 2-3 years to maybe every 10 - 20 years. Depending on the interval between dredging and disposal, the ecosystem at each of the dredging and disposal areas may reach a state of equilibrium before the next disturbance. Benthic organisms would be removed each time a site is dredged. These organisms would be relocated to a different site if in-water disposal is used and would possibly help replace the organisms that would be buried by the dredged material. If upland disposal is used, the organisms would be lost to the aquatic ecosystem. At the dredging site, benthic organisms should re-colonize the site within 6 months to a year.

Continued in-water disposal to create shallow water habitat could have a positive effect on salmonids, especially fall chinook. Inundation of the Snake River canyon by the reservoirs eliminated the shallow water sand bars that the juvenile fall chinook used for resting and rearing during their outmigration. In-water disposal conducted using

Dr. Bennett's criteria for suitable habitat could replace some of this lost habitat and help improve survival of juvenile fall chinook.

5. ENVIRONMENTAL REVIEW REQUIREMENTS.

a. Federal Statutes.

1) Reservoir Salvage Act of 1960, As Amended; National Historic Preservation Act, As Amended; Executive Order 11593, Protection and Enhancement of the Cultural Environment, May 13, 1971.

As stated in Section 4.e., the Corps has determined there are no known cultural resources located within the dredging and disposal sites for the proposed 2000-2001 dredging. The Corps has distributed its report to the affected consulting parties as required by Section 106 of the National Historic Preservation Act.

The Corps is unable to make a determination of the effect of future dredged material disposal on cultural resources as the disposal sites used after the 2000-2001 dredging would be selected with input from the RDT. Because members of the RDT include the State Historic Preservation Offices and representatives of the affected tribal groups, there is the opportunity for cultural resource concerns to be considered in the RDT's recommendation for disposal of the dredged material. Also, for each proposed dredging event in future years, the Corps would make a determination of the effect on cultural resources and consult with the affected parties.

2) Clean Air Act, As Amended.

Pursuant to Section 176(C) and 309 of the Act, this environmental assessment will be provided to the Environmental Protection Agency. Operation of the dredging machinery, tug, and other equipment would cause a minor temporary increase in air emissions because of the exhaust.

3) Clean Water Act.

Discharge of dredged fill material below the line of ordinary high water in the waterway requires evaluation under Section 404 of the Act. The Corps has prepared a Section 404(b)(1) evaluation for the 2000-2001 dredging (Appendix A). The Corps has requested water quality certification from Washington Department of Ecology prior to dredging as required under Section 401 of the Act. Water quality certification is not needed from the state of Idaho as the project involves navigation dredging and does not involve placement of fill in waters of Idaho.

The Corps will prepare a Section 404(b)(1) evaluation for each future dredging event and will request Section 401 water quality certification from the appropriate state(s) as needed.

4) Endangered Species Act of 1973, As Amended.

See Section 4.d. Endangered Species. The Corps prepared two Biological Assessments (BA's) for the proposed 2000-2001 dredging and disposal. The Corps prepared a BA documenting its determination that the 2000-2001 activities "*may affect but are not likely to adversely affect*" listed anadromous fish stocks (Snake River sockeye salmon, Snake River spring/summer chinook salmon, Snake River fall chinook salmon, Snake River Basin steelhead, Middle Columbia River steelhead). The Corps sent this BA to NMFS and requested concurrence with this determination.

The Corps also prepared a BA documenting its determination that the 2000-2001 dredging and disposal "*may affect but is not likely to adversely affect*" listed non-anadromous fish and birds (bull trout, bald eagles). The BA also documented the Corps determination that the activities would have "no effect" on listed plant species Ute ladies' tresses and Spaulding's silene). The Corps sent this BA to USFWS and requested concurrence with this determination.

For future dredging and disposal activities, the Corps will prepare BA's documenting its determination of effect on listed species. The Corps will send these to NMFS and USFWS and request concurrence with its determination.

5) Fish and Wildlife Coordination Act.

This project is being coordinated with the U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, and Idaho Department of Fish and Game. Because this is an operation and maintenance activity, a Coordination Act Report is not required.

6) National Environmental Policy Act (NEPA).

This environmental assessment is prepared and circulated to agencies and the public for review and comment pursuant to requirements of the Act. Full compliance with NEPA will be achieved when the Finding of No Significant Impact (FONSI), if one is determined to be appropriate, is signed.

7) Wild and Scenic Rivers Act.

This segment of the Snake, Clearwater, and Columbia Rivers is not included on the inventory of wild and scenic rivers.

8) Northwest Electric Power Planning and Conservation Act.

The project will not conflict with the requirements of the Act or the Columbia Basin Fish and Wildlife Program which was developed in response to the Act.

b. Executive Orders.

1) Executive Order 11988, Flood Plain Management, May 24, 1977.

The dredging project will not change flood plain nor encourage development within the floodplain.

2) Executive Order 11990, Protection of Wetlands, May 24, 1977.

No wetlands will be impacted by the proposed action.

c. Executive Memorandums.

1) CEQ Memorandum, August 10, 1980, Interagency Consultation to Avoid or Mitigate Adverse Effects on Rivers in the Nationwide Inventory.

This segment of the Snake, Clearwater, and Columbia Rivers is not included in the inventory of wild and scenic rivers.

d. State Permits.

1) Hydraulic Project Approval.

The Corps has determined that neither the agency nor its contractors will be required to obtain a Hydraulic Project Approval from the Washington Department of Fish and Wildlife for any dredging or disposal actions.

2) Stream Alteration Permit.

A Stream Alteration Permit from the Idaho Department of Water Resources is not required as all work in the state of Idaho would occur within the backwater areas of Lower Granite Reservoir.

6. CONSULTATION AND COORDINATION.

This EA is being distributed for public and agency review and comment and is also available through the Walla Walla District Corps of Engineers website at www.nww.usace.army.mil. The distribution list includes the following:

Northwestern Division Corps of Engineers
Portland, OR

Portland District Corps of Engineers
Portland, OR

Seattle District Corps of Engineers
Seattle, WA

U.S. Environmental Protection Agency
Seattle, WA

U.S. Fish and Wildlife Service
Spokane, WA

U.S. Fish and Wildlife Service
Boise, ID

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Portland, OR

National Marine Fisheries Service
Portland, OR

National Marine Fisheries Service
Lacey, WA

National Marine Fisheries Service
Boise, ID

Washington Department of Fish and Wildlife
Kennewick, WA

Washington Department of Fish and Wildlife
Olympia, WA

Washington Department of Fish and Wildlife
Spokane, WA

Washington Department of Ecology
Olympia, WA

Washington Department of Ecology
Spokane, WA

Washington Department of Natural Resources
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Idaho Department of Fish and Game
Lewiston, ID

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Lewiston, ID

Idaho Department of Water Resources
Coeur D'Alene, ID

Oregon Department of Fish and Wildlife
LaGrande, OR

Oregon Department of Environmental Quality
Bend, OR

Oregon Department of Environmental Quality
Pendleton, OR

Oregon Division of State Lands
Bend, OR

Columbia River Inter-Tribal Fish Commission
Portland, OR

Northwest Power Planning Council
Portland, OR

Columbia Basin Fish and Wildlife Authority
Portland, OR

Office of Archaeology & Historic Preservation
Olympia, WA

Idaho State Historical Society
Boise, ID

State Historic Preservation Office
Salem, OR

Nez Perce Tribe of Idaho

Lapwai, ID

Confederated Tribes and Bands of the Yakama Indian Nation
Toppenish, WA

Confederated Tribes of the Umatilla Reservation
Pendleton, OR

Confederated Tribes of the Colville Reservation
Nespelem, WA

Public Utility District of Grant County
Ephrata, WA

Port of Lewiston
Lewiston, ID

Port of Clarkston
Clarkston, WA

Port of Whitman County
Colfax, WA

Port of Walla Walla
Walla Walla, WA

Port of Umatilla
Umatilla, OR

Port of Pasco
Pasco, WA

Port of Kennewick
Kennewick, WA

Port of Benton
Richland, WA

Port of Kahlotus
Pasco, WA

Port of Columbia
Dayton, WA

Port of Garfield
Pomeroy, WA

Asotin County Commissioners
Asotin, WA

Garfield County Commissioners
Pomeroy, WA

Columbia County Commissioners
Dayton, WA

Walla Walla County Commissioners
Walla Walla, WA

Whitman County Commissioners
Colfax, WA

Benton County Commissioners
Prosser, WA

Franklin County Commissioners
Pasco, WA

Nez Perce County Commissioners
Lewiston, ID

Umatilla County Commissioners
Pendleton, OR

Columbia River Towboat Association
Portland, OR

Pacific Northwest Waterways Association
Vancouver, WA

Brix Maritime
Portland, OR

Brix Maritime
Clarkston, WA

Brix Maritime

Lewiston, ID

Tidewater Barge Lines
Vancouver, WA

Shaver Transportation
Portland, OR

Bernard Barge Lines
Oregon City, OR

Pacific Inland Navigation
Portland, OR

Lewis and Clark Terminal Association
Lewiston, ID

Tri-State Steelheaders
Walla Walla, WA

Idaho Steelhead and Salmon Unlimited
Boise, ID

Blue Mountain Audubon Society
Walla Walla, WA

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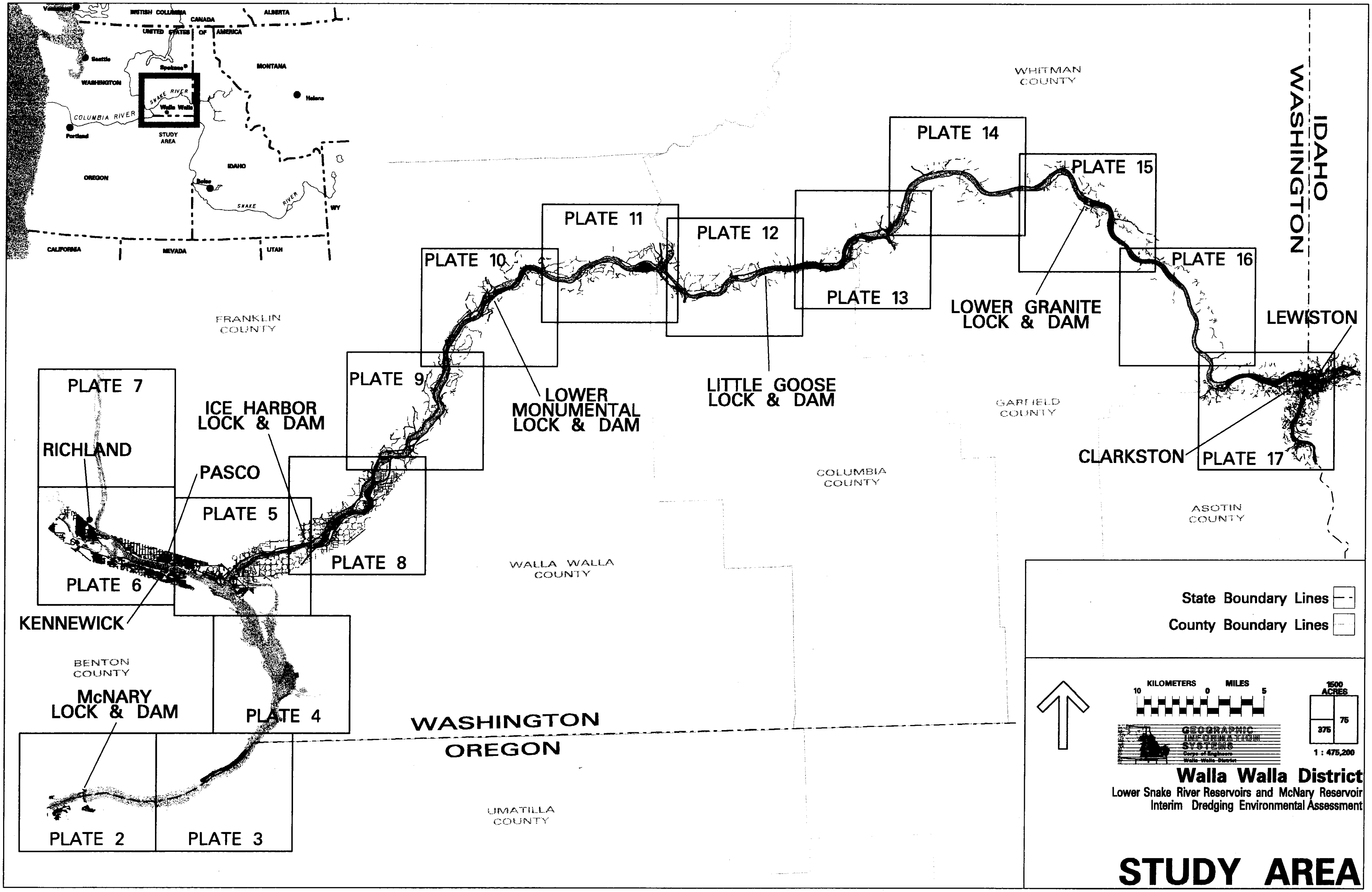

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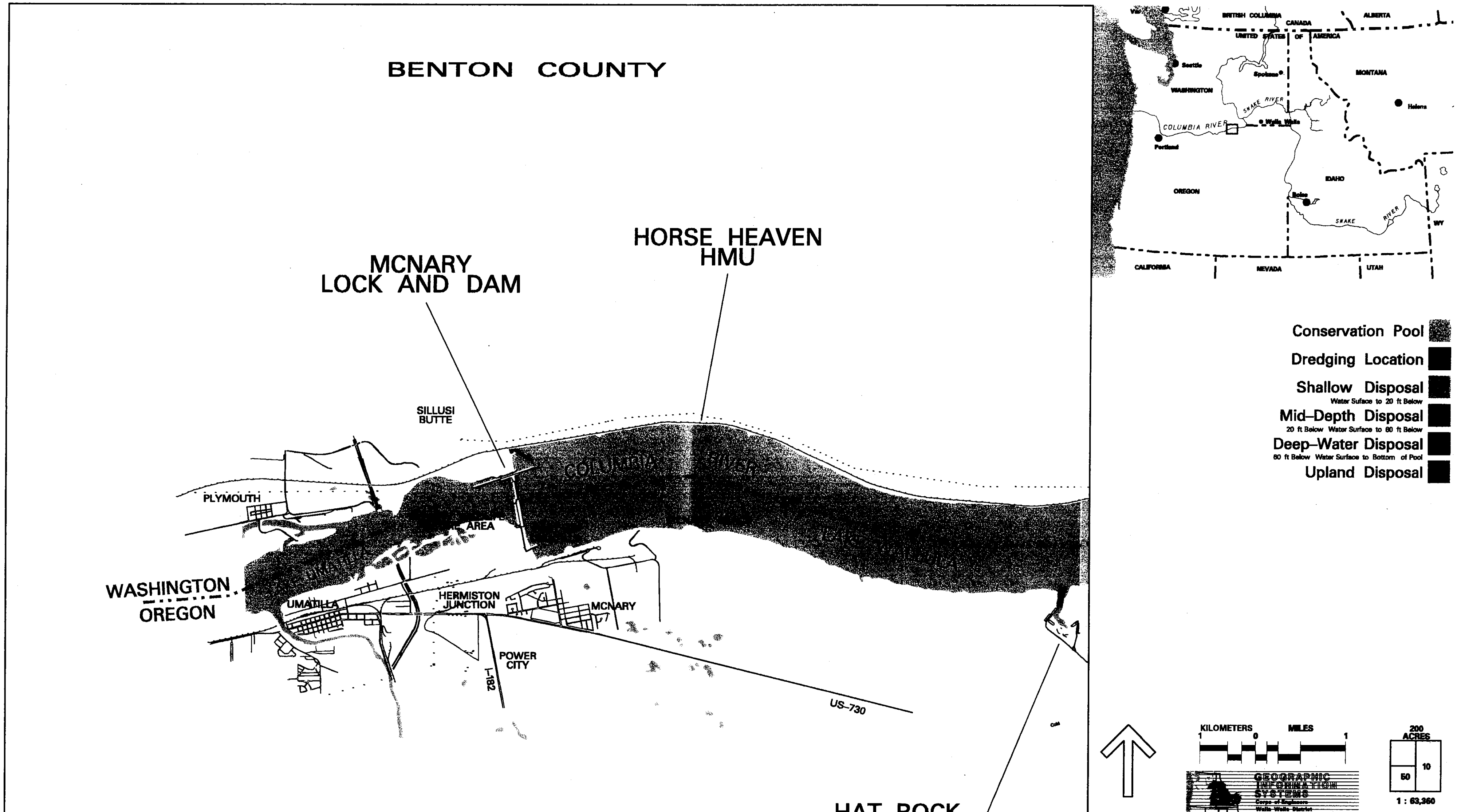

Walla Walla District
Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment
McNary Dam and Reservoir: RM 289 - 298

DREDGING AND DISPOSAL SITES

2000 PLATE 2

GIS Data Entry & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT) GIS Conversion: George Hardin (CENWW-PM-PD-E-AT) GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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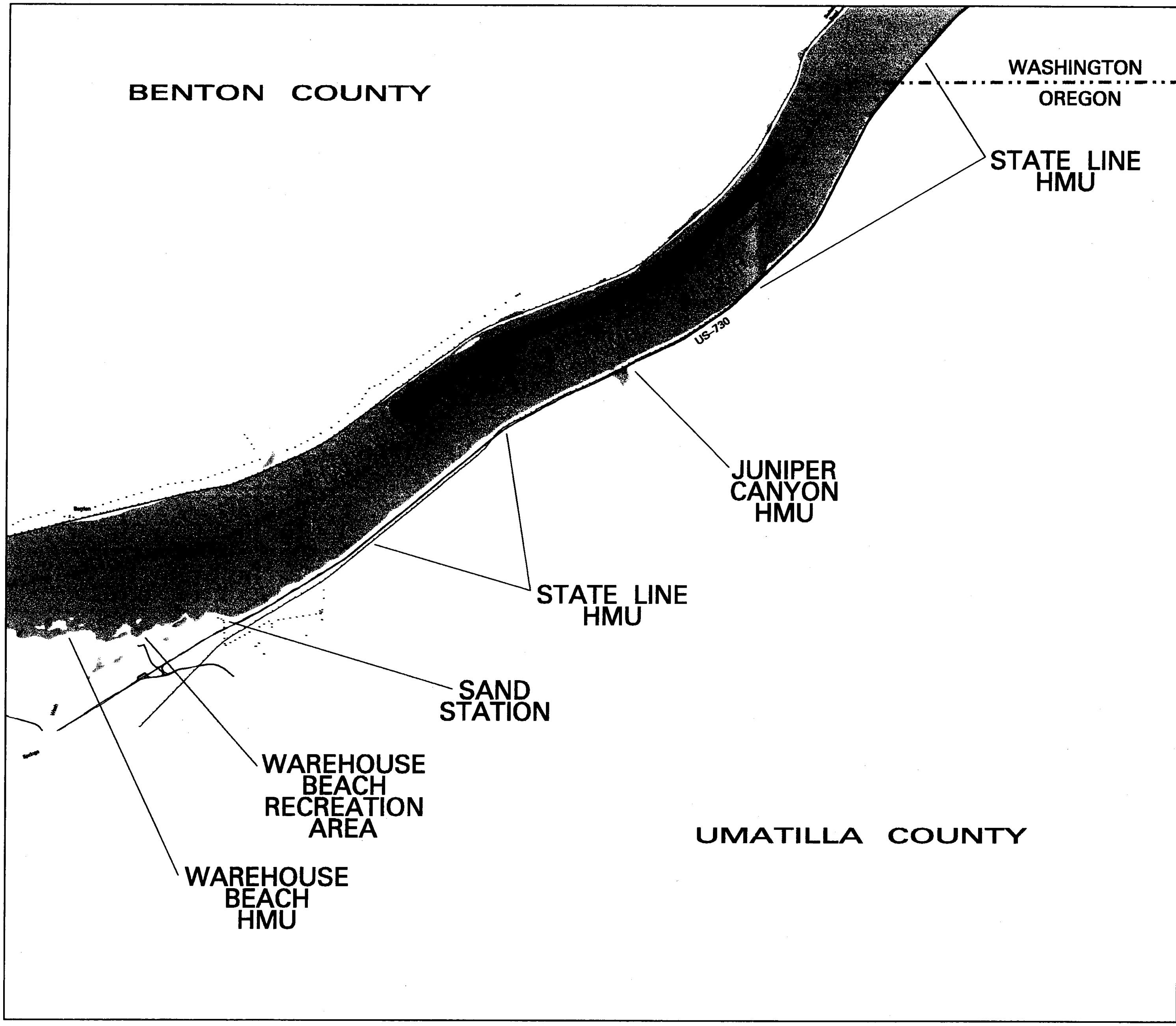

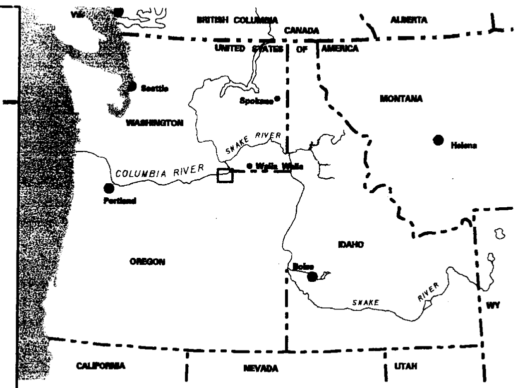

Conservation Pool
Dredging Location
Shallow Disposal
Water Surface to 20 ft Below
Mid–Depth Disposal
20 ft Below Water Surface to 60 ft Below
Deep–Water Disposal
60 ft Below Water Surface to Bottom of Pool
Upland Disposal

KILOMETERS 1 0 MILES 1

200 ACRES 10 50

1 : 63,360

GEOGRAPHIC INFORMATION SYSTEMS
Corps of Engineers
Walla Walla District

Walla Walla District
Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment
McNary Reservoir: RM 299 – 310

DREDGING AND DISPOSAL SITES

2000 PLATE 3

GIS Data Entry & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT) GIS Conversion: George Hardin (CENWW-PM-PD-E-AT) GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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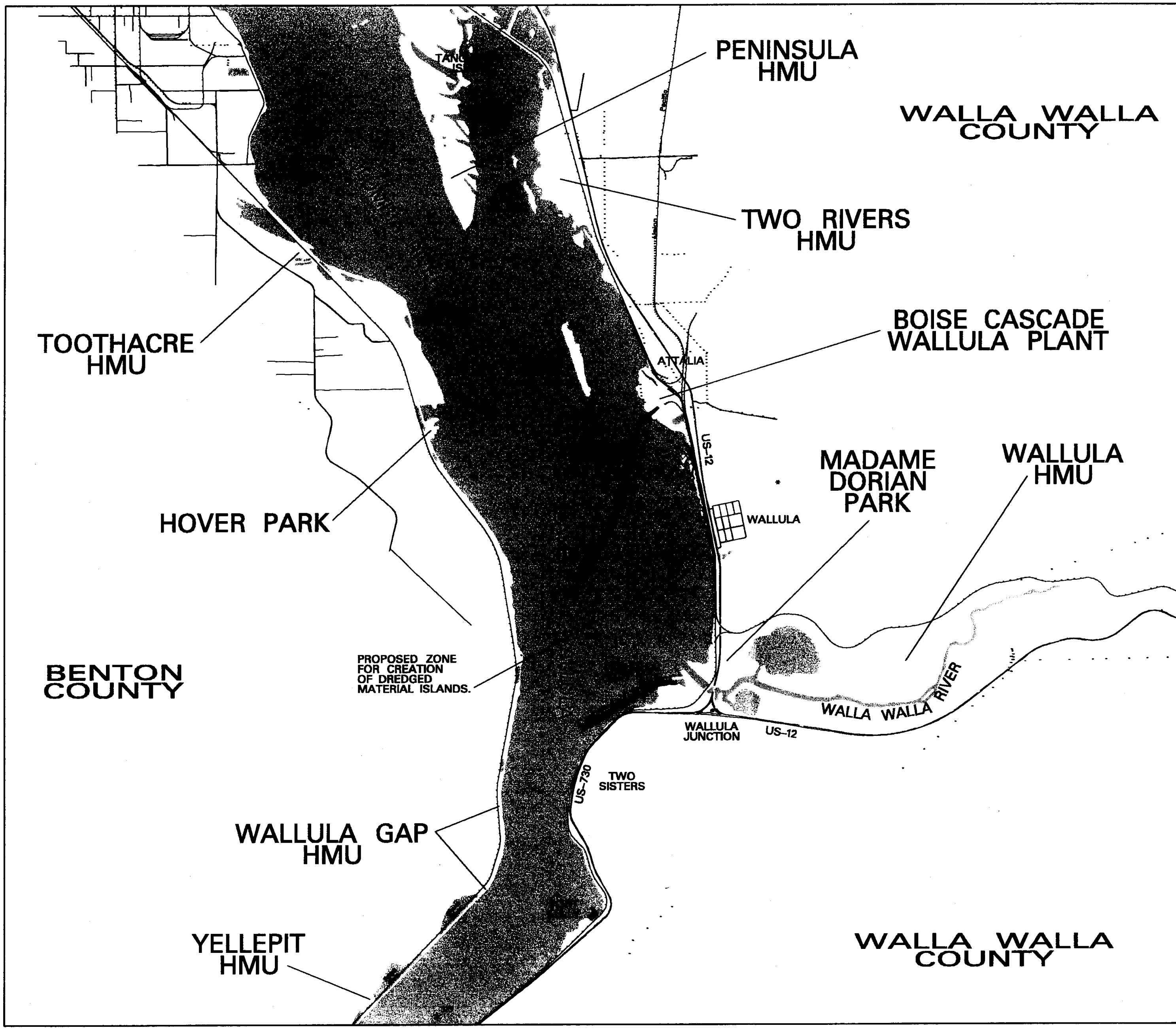

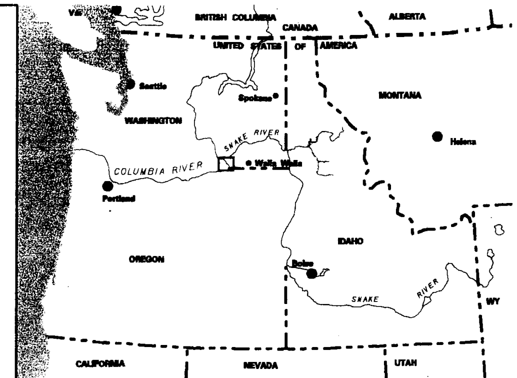

Conservation Pool
Dredging Location
Shallow Disposal
Water Surface to 20 ft Below
Mid-Depth Disposal
20 ft Below Water Surface to 60 ft Below
Deep-Water Disposal
60 ft Below Water Surface to Bottom of Pool
Upland Disposal

KILOMETERS 1 0 MILES 1

200 ACRES 50 10

1 : 63,360

GEOGRAPHIC INFORMATION SYSTEMS
Corps of Engineers
Walla Walla District

Walla Walla District
Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment

McNary Reservoir: RM 310 - 321

DREDGING AND DISPOSAL SITES

2000

PLATE 4

GIS Data Entry & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT) GIS Conversion: George Hardin (CENWW-PM-PD-E-AT) GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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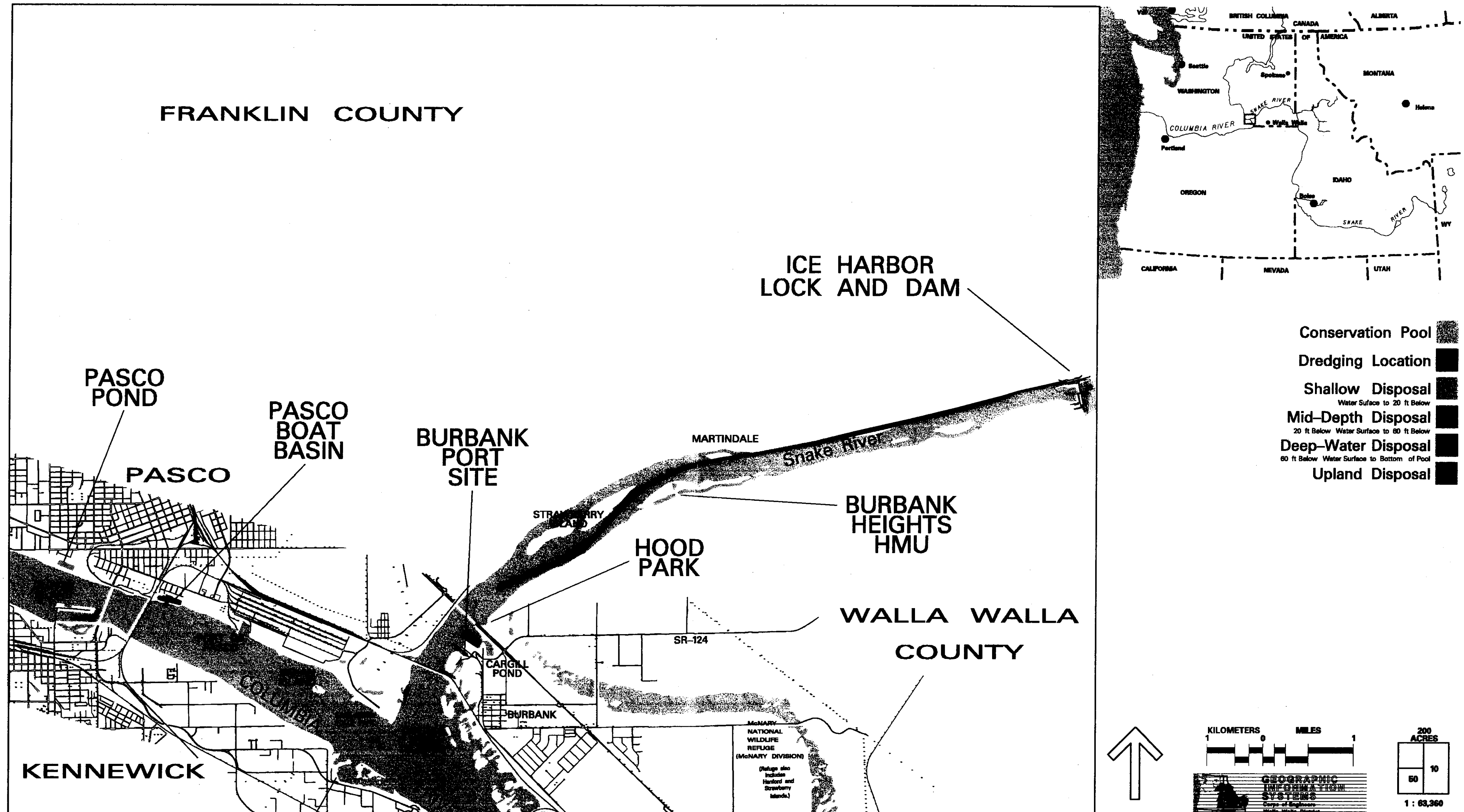

Walla Walla District
Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment
McNary Reservoir: RM 322 - 329

DREDGING AND DISPOSAL SITES

2000 PLATE 5

GIS Data Entry & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT) GIS Conversion: George Hardin (CENWW-PM-PD-E-AT) GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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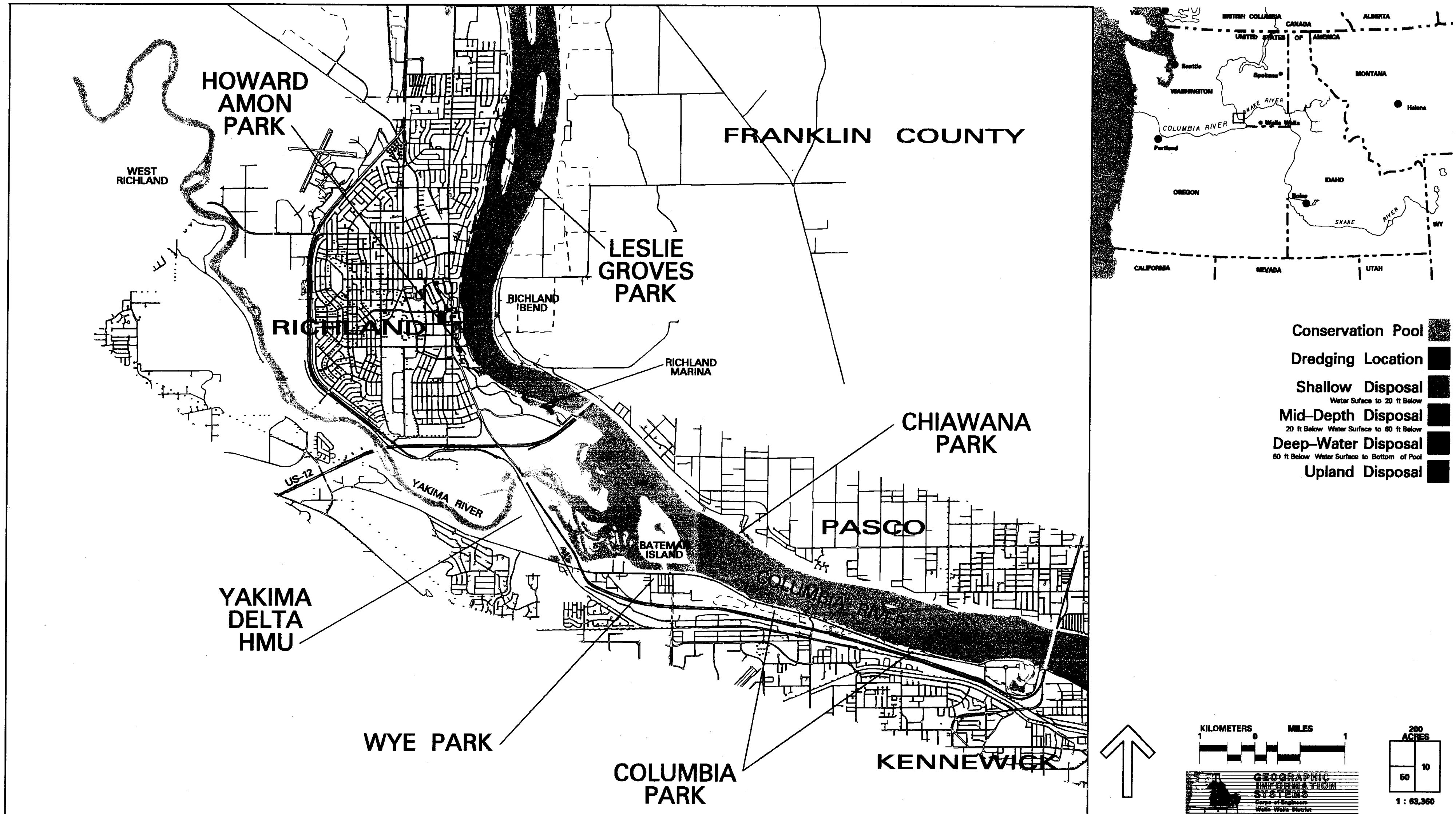

Walla Walla District

Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment

McNary Reservoir: RM 330 – 341

DREDGING AND DISPOSAL SITES

2000

PLATE 6

GIS Data Entry & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT) GIS Conversion: George Hardin (CENWW-PM-PD-E-AT) GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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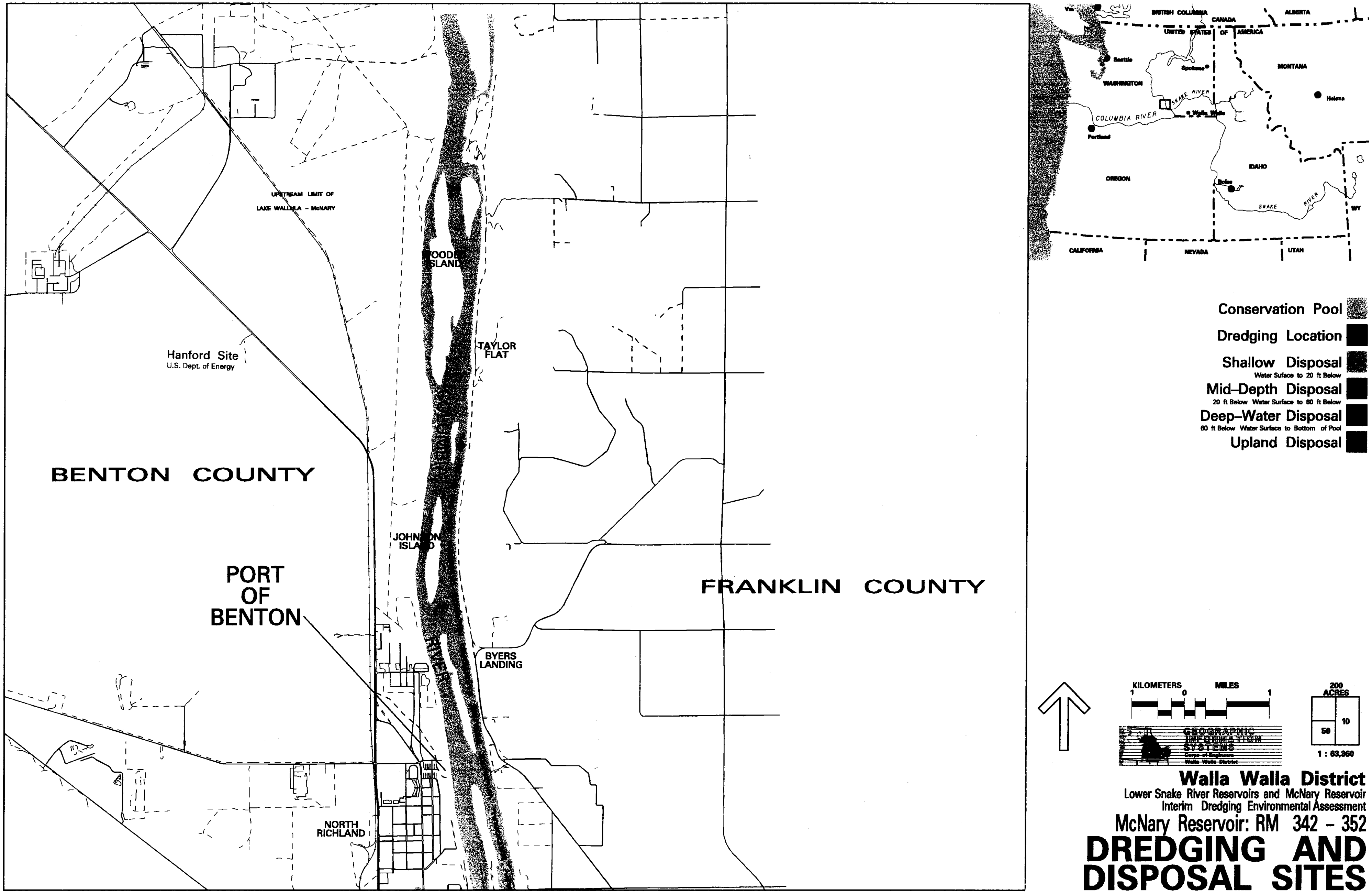

Walla Walla District
Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment
McNary Reservoir: RM 342 - 352

DREDGING AND DISPOSAL SITES

2000

PLATE 7

GIS Data Entry & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT) GIS Conversion: George Hardin (CENWW-PM-PD-E-AT) GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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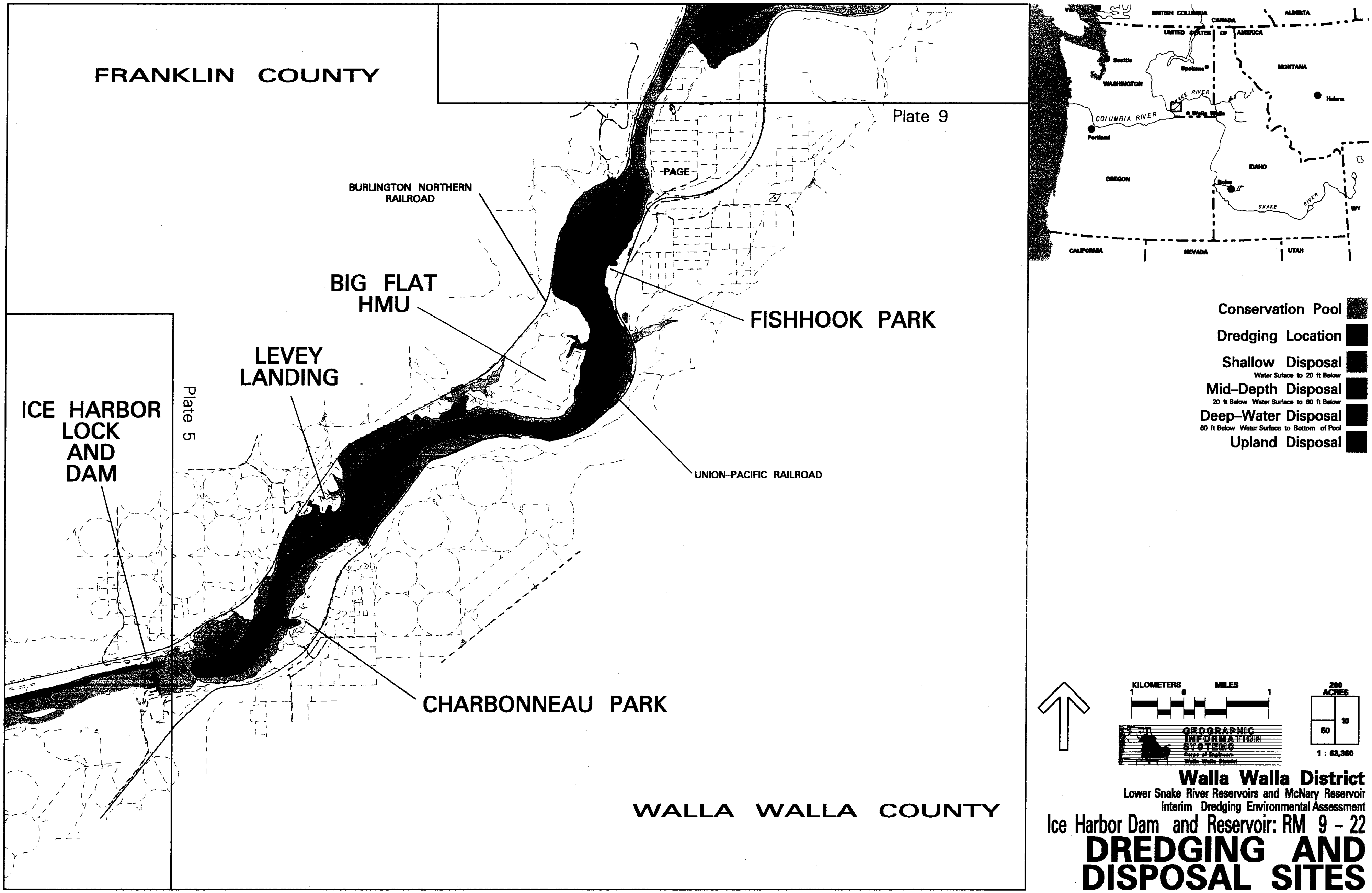

Walla Walla District
Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment
Ice Harbor Dam and Reservoir: RM 9 - 22

DREDGING AND DISPOSAL SITES

2000 PLATE 8

GIS Data Entry & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT) GIS Conversion: George Hardin (CENWW-PM-PD-E-AT) GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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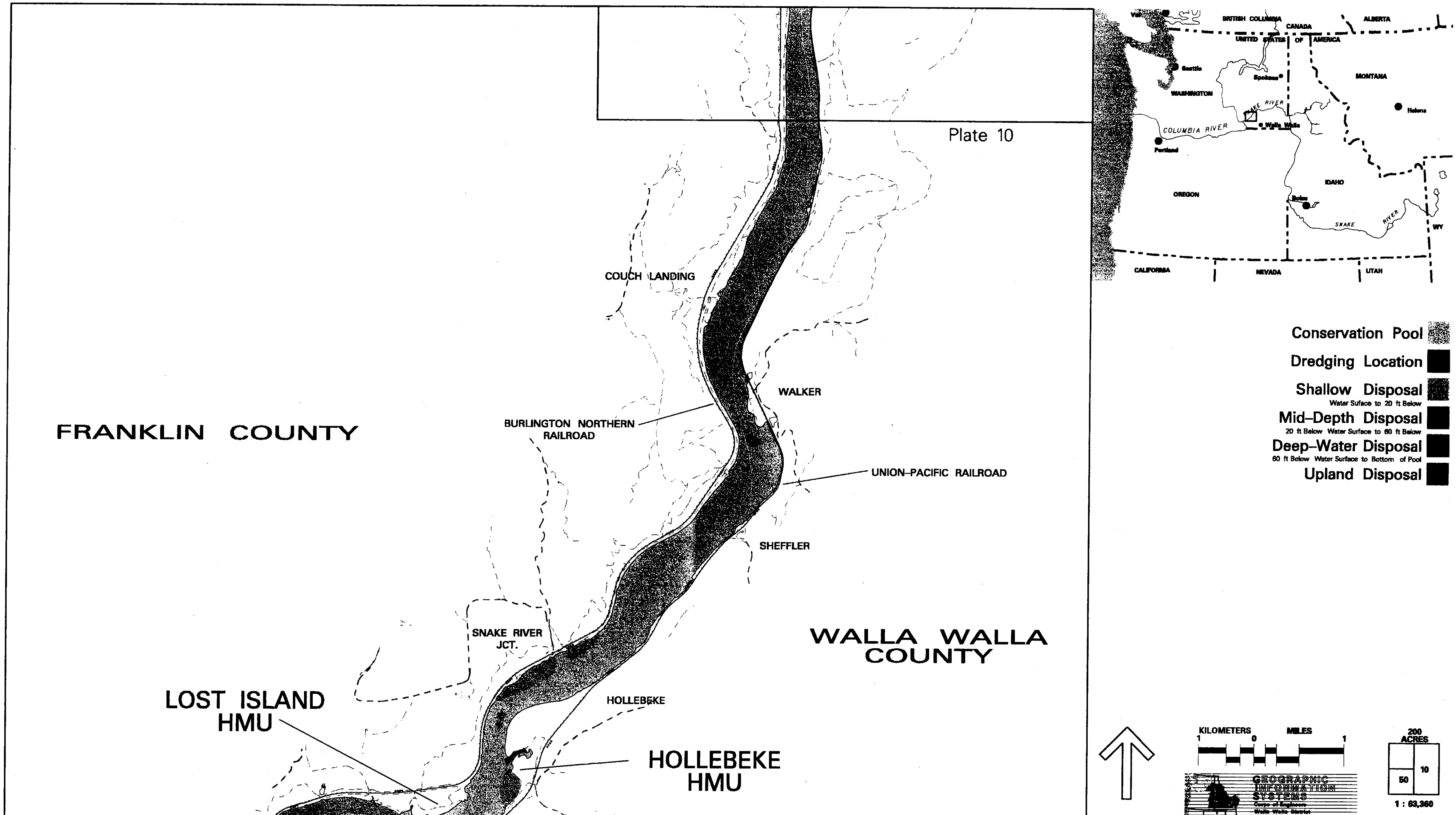

Walla Walla District
Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment

Ice Harbor Reservoir: RM 21 - 35

DREDGING AND DISPOSAL SITES

2000

PLATE 9

GIS Data Entry & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT) GIS Conversion: George Hardin (CENWW-PM-PD-E-AT) GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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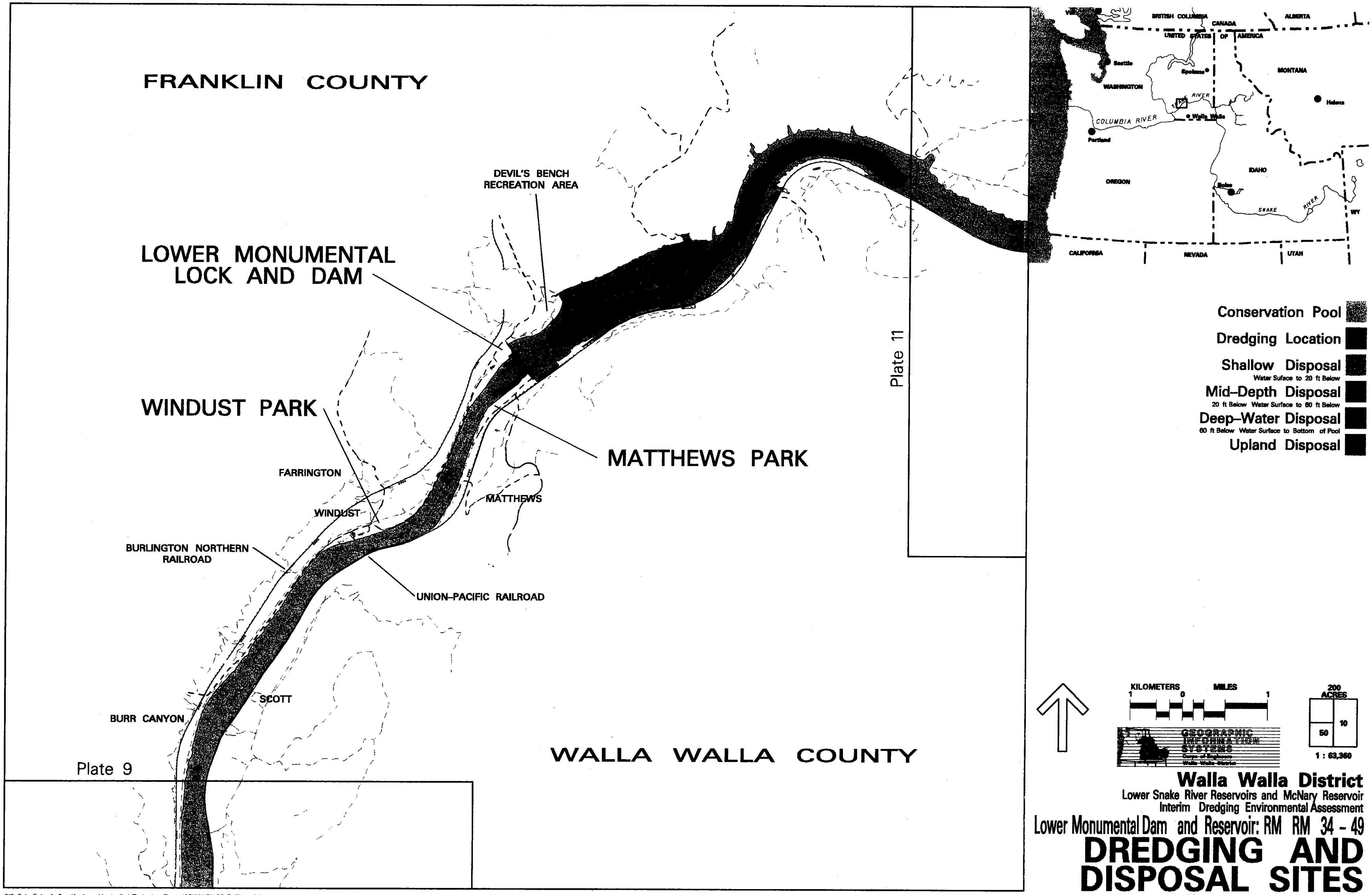

Walla Walla District
Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment

Lower Monumental Dam and Reservoir: RM RM 34 - 49

DREDGING AND DISPOSAL SITES

2000

PLATE 10

GIS Data Entry & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT) GIS Conversion: George Hardin (CENWW-PM-PD-E-AT) GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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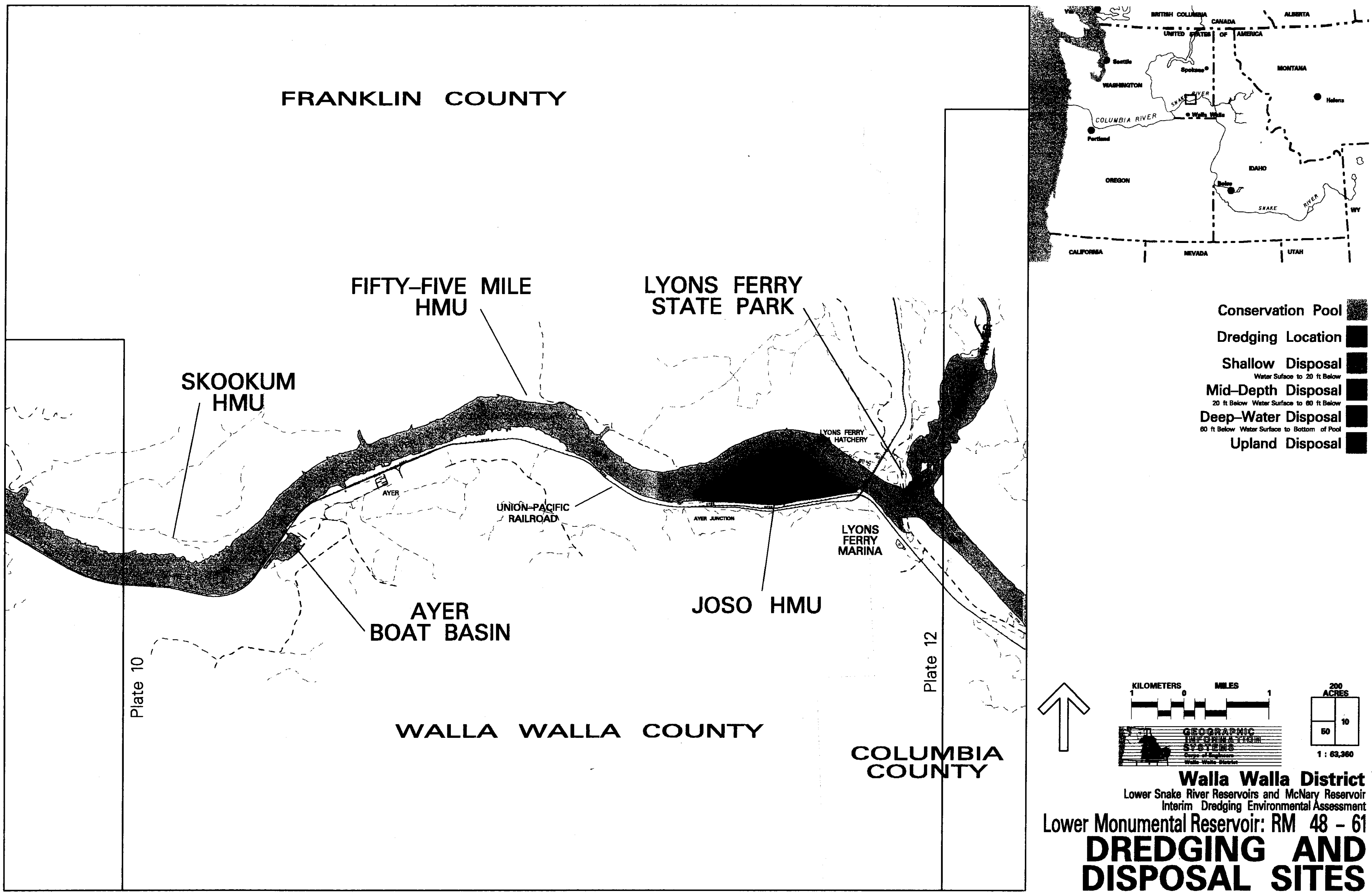

Walla Walla District
Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment

Lower Monumental Reservoir: RM 48 - 61

DREDGING AND DISPOSAL SITES

2000 PLATE 11

GIS Data Entry & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT) GIS Conversion: George Hardin (CENWW-PM-PD-E-AT) GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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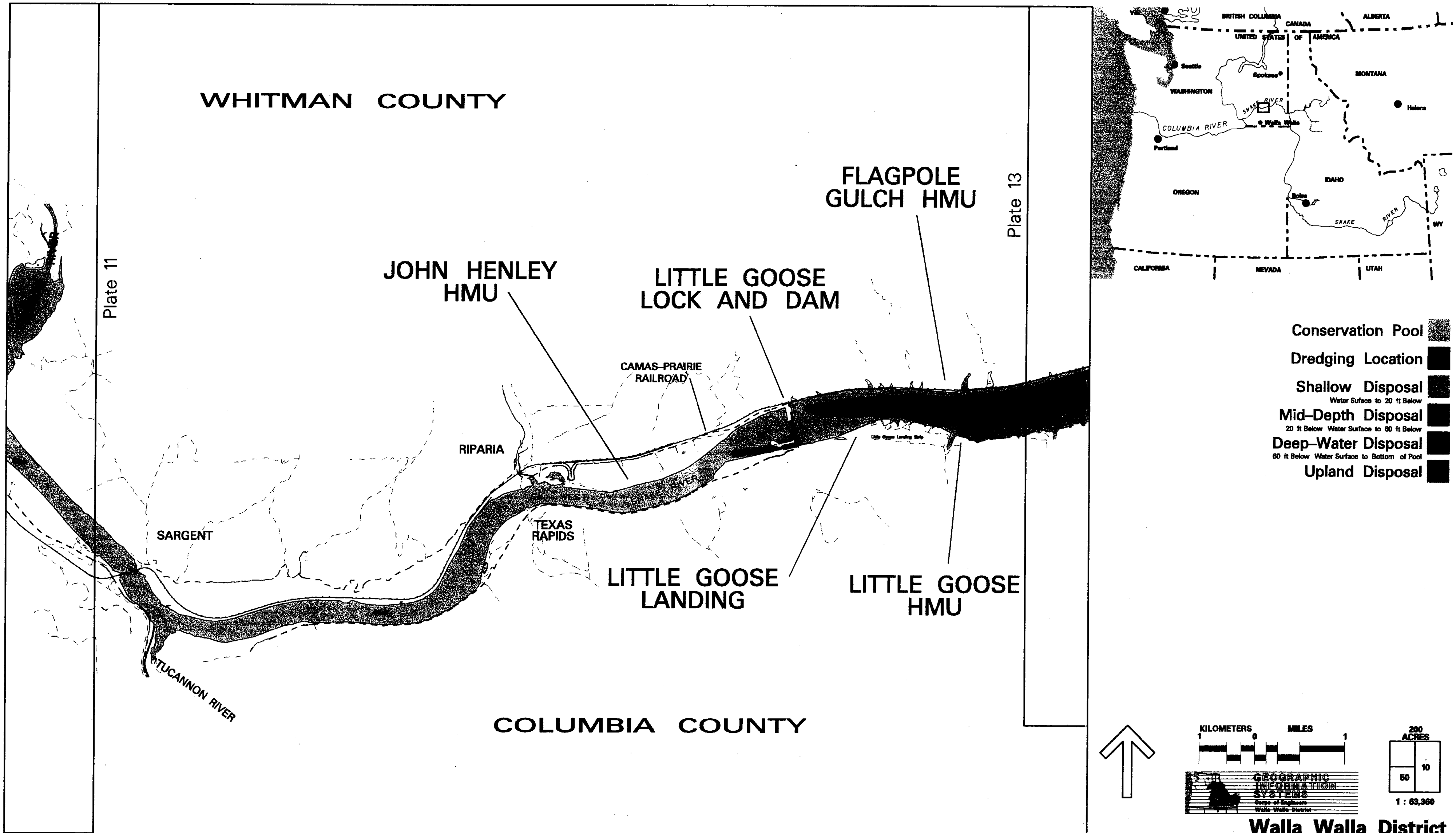

Walla Walla District

Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment

Little Goose Dam and Reservoir: RM 60 – 74

DREDGING AND DISPOSAL SITES

2000

PLATE 12

GIS Data Entry & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT) GIS Conversion: George Hardin (CENWW-PM-PD-E-AT) GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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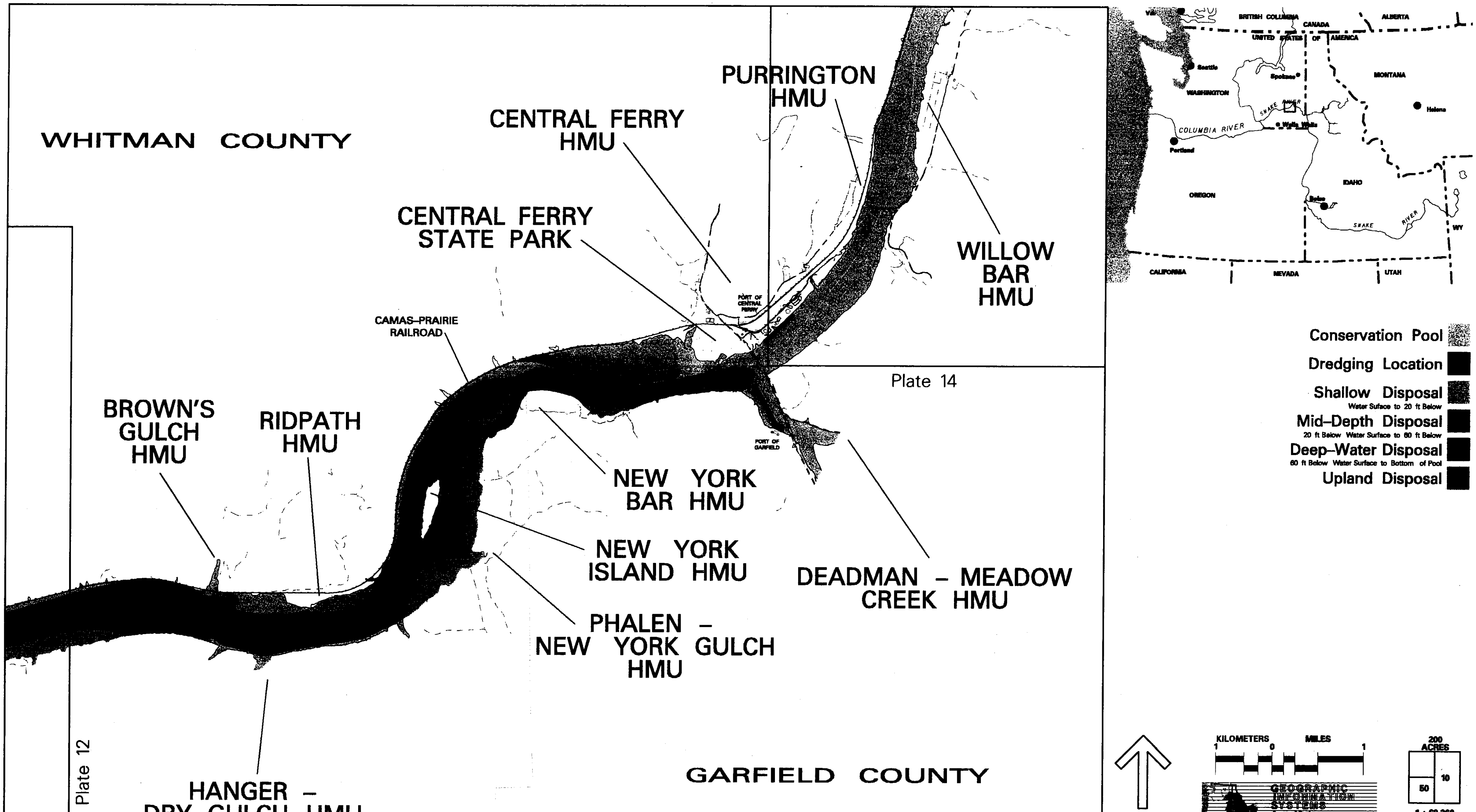

Walla Walla District
Lower Snake River Reservoirs and McNary Reservoirs
Interim Dredging Environmental Assessment

Little Goose Reservoir: RM 73 – 87
DREDGING AND DISPOSAL SITES

2000

PLATE 13

GIS Data Entry & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT)   GIS Conversion: George Hardin (CENWW-PM-PD-E-AT)   GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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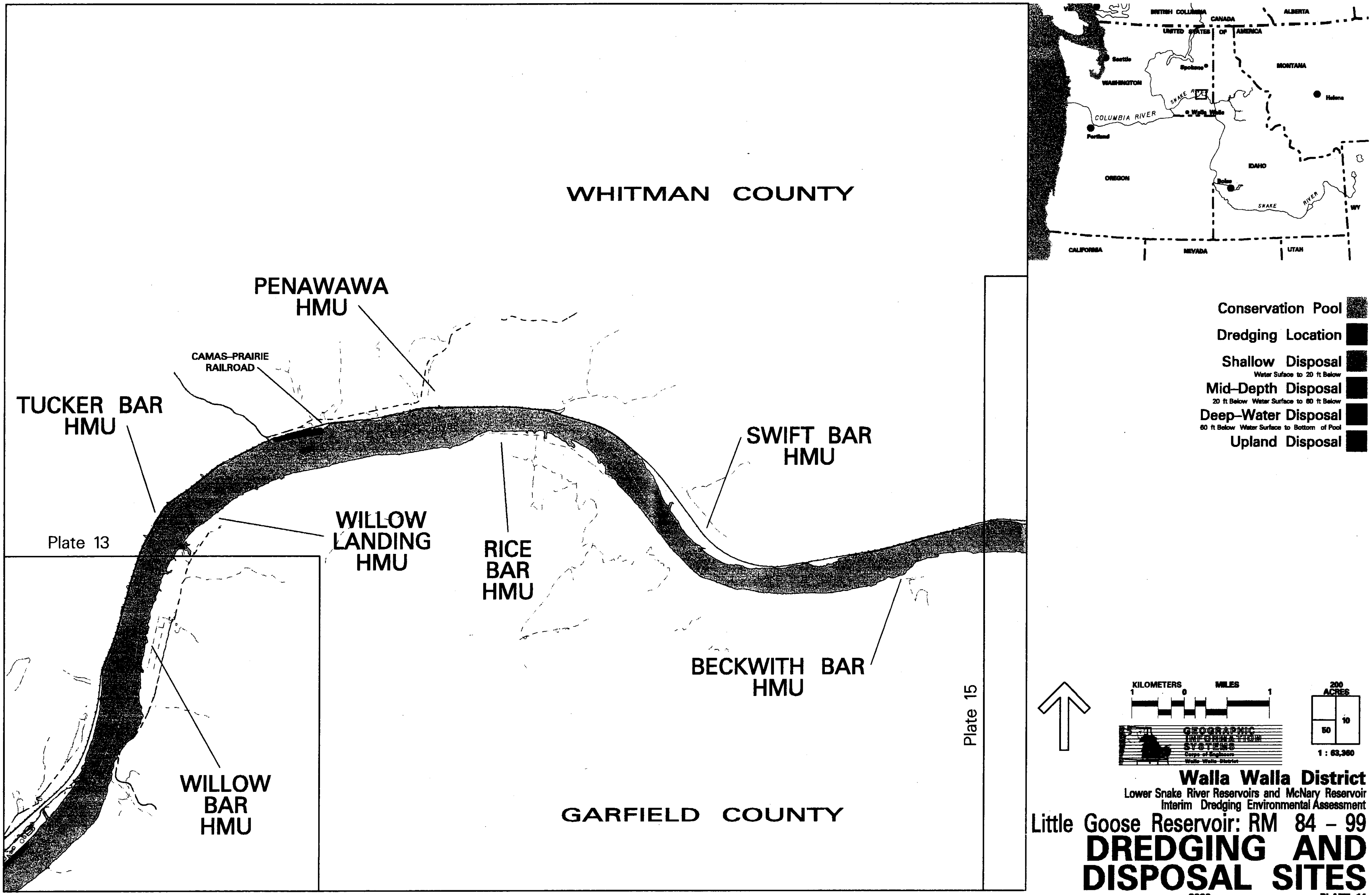

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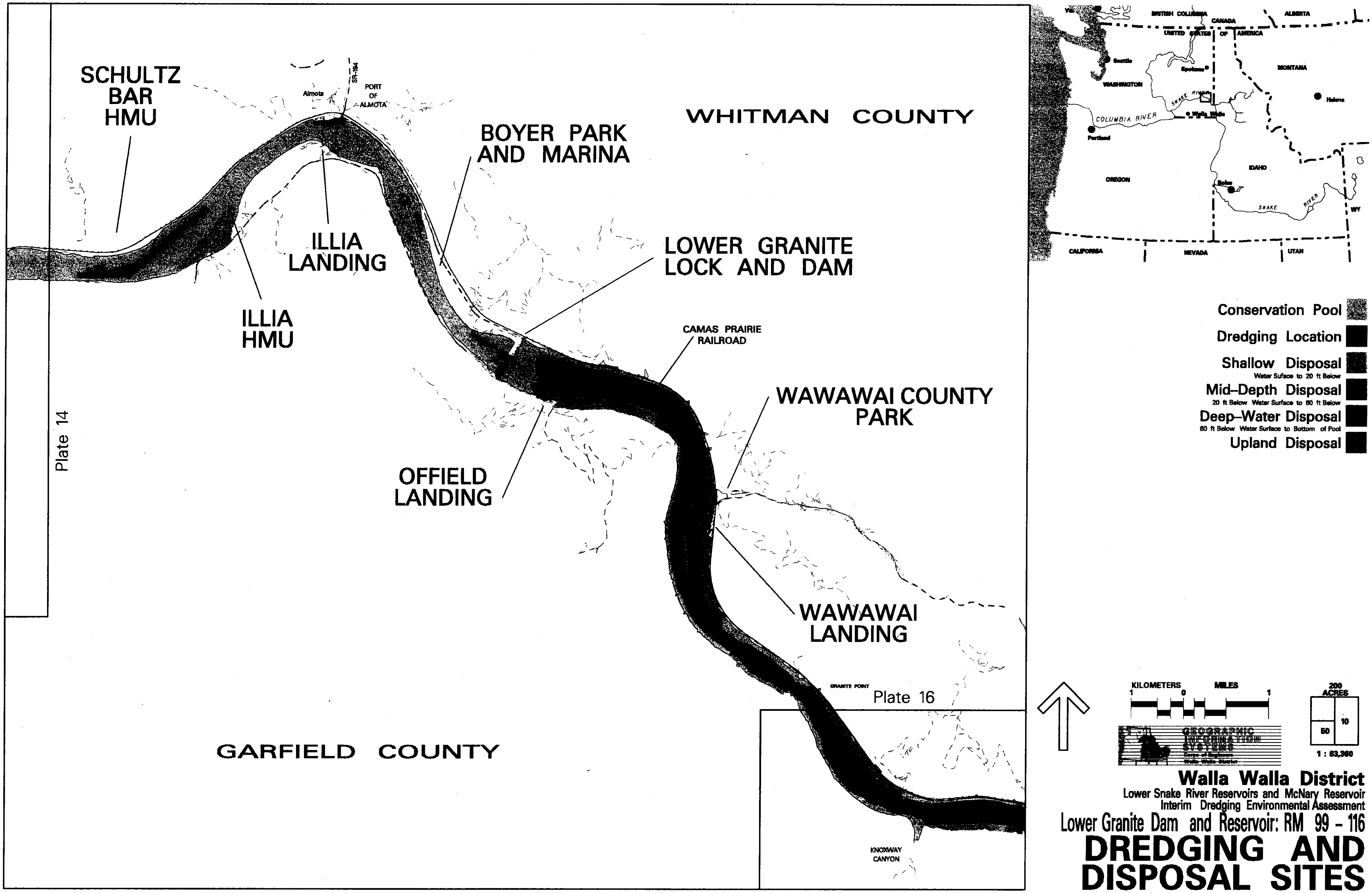

Walla Walla District
Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment
Lower Granite Dam and Reservoir: RM 99 - 116

DREDGING AND DISPOSAL SITES

2000

PLATE 15

GIS Data Entry & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT) GIS Conversion: George Hardin (CENWW-PM-PD-E-AT) GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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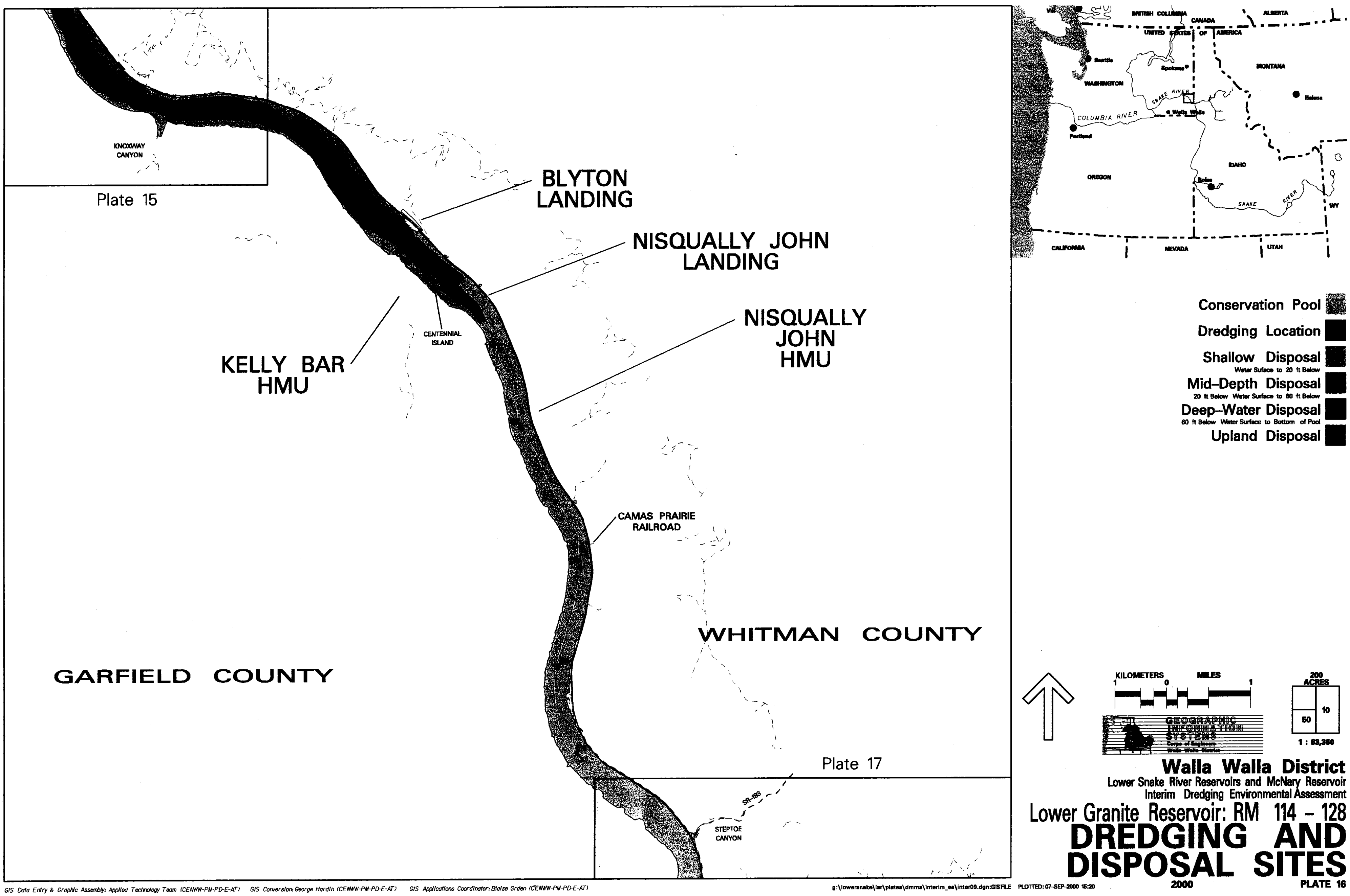
Plate 15
KNOXWAY CANYON
BLYTON LANDING
NISQUALLY JOHN LANDING
NISQUALLY JOHN HMU
KELLY BAR HMU
CENTENNIAL ISLAND
CAMAS PRAIRIE RAILROAD
WHITMAN COUNTY
GARFIELD COUNTY
Plate 17
SR-193
STEPTOE CANYON
BRITISH COLUMBIA
CANADA
ALBERTA
UNITED STATES OF AMERICA
MONTANA
WASHINGTON
Seattle
Spokane
Helena
SNAKE RIVER
COLUMBIA RIVER
Walla Walla
Portland
OREGON
IDAHO
Boise
WY
CALIFORNIA
NEVADA
UTAH
Conservation Pool
Dredging Location
Shallow Disposal
Water Surface to 20 ft Below
Mid-Depth Disposal
20 ft Below Water Surface to 60 ft Below
Deep-Water Disposal
60 ft Below Water Surface to Bottom of Pool
Upland Disposal
KILOMETERS
MILES
200 ACRES
50
10
1 : 63,360
GEOGRAPHIC INFORMATION SYSTEMS
Walla Walla District
Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment
Lower Granite Reservoir: RM 114 - 128
DREDGING AND DISPOSAL SITES
2000
PLATE 16
GIS Data Entry & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT) GIS Conversion: George Hardin (CENWW-PM-PD-E-AT) GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)
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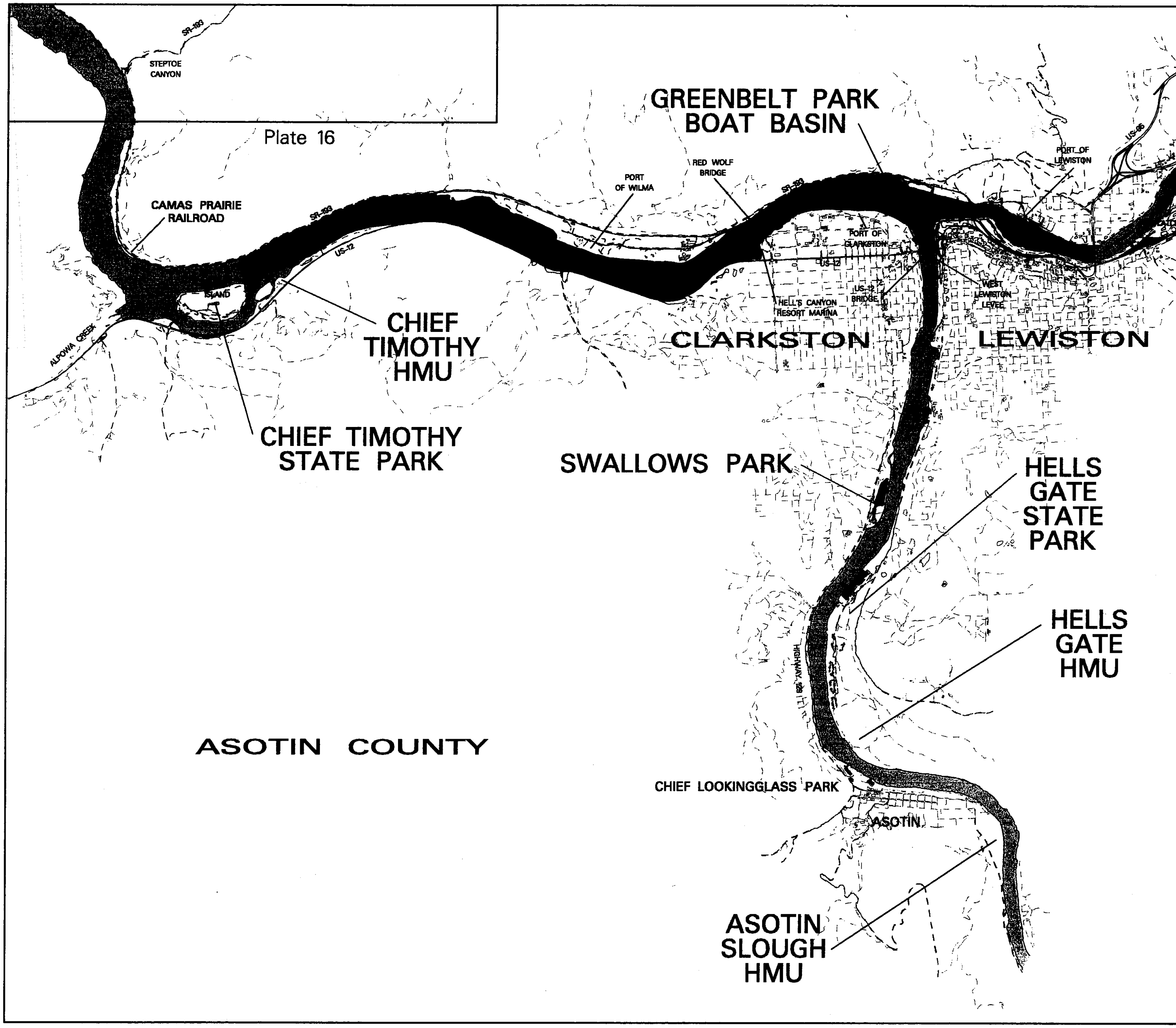

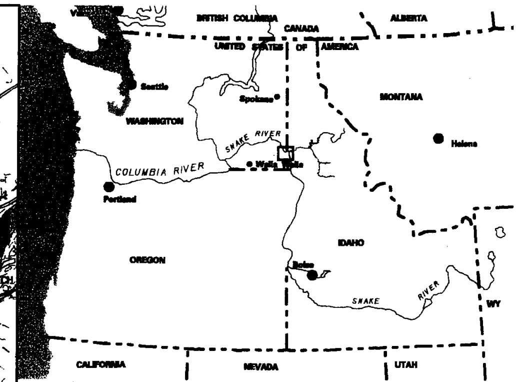

Conservation Pool

Dredging Location

Shallow Disposal
Water Suface to 20 ft Below

Mid–Depth Disposal
20 ft Below Water Surface to 60 ft Below

Deep–Water Disposal
60 ft Below Water Surface to Bottom of Pool

Upland Disposal

KILOMETERS 1 0 MILES 1

GEOGRAPHIC INFORMATION SYSTEMS
Corps of Engineers
Walla Walla District

200 ACRES
10
50
1 : 63,360

Walla Walla District
Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment

Lower Granite Reservoir: RM 127 – 147

DREDGING AND DISPOSAL SITES

2000

PLATE 17

GIS Data Entry & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT)   GIS Conversion: George Hardin (CENWW-PM-PD-E-AT)   GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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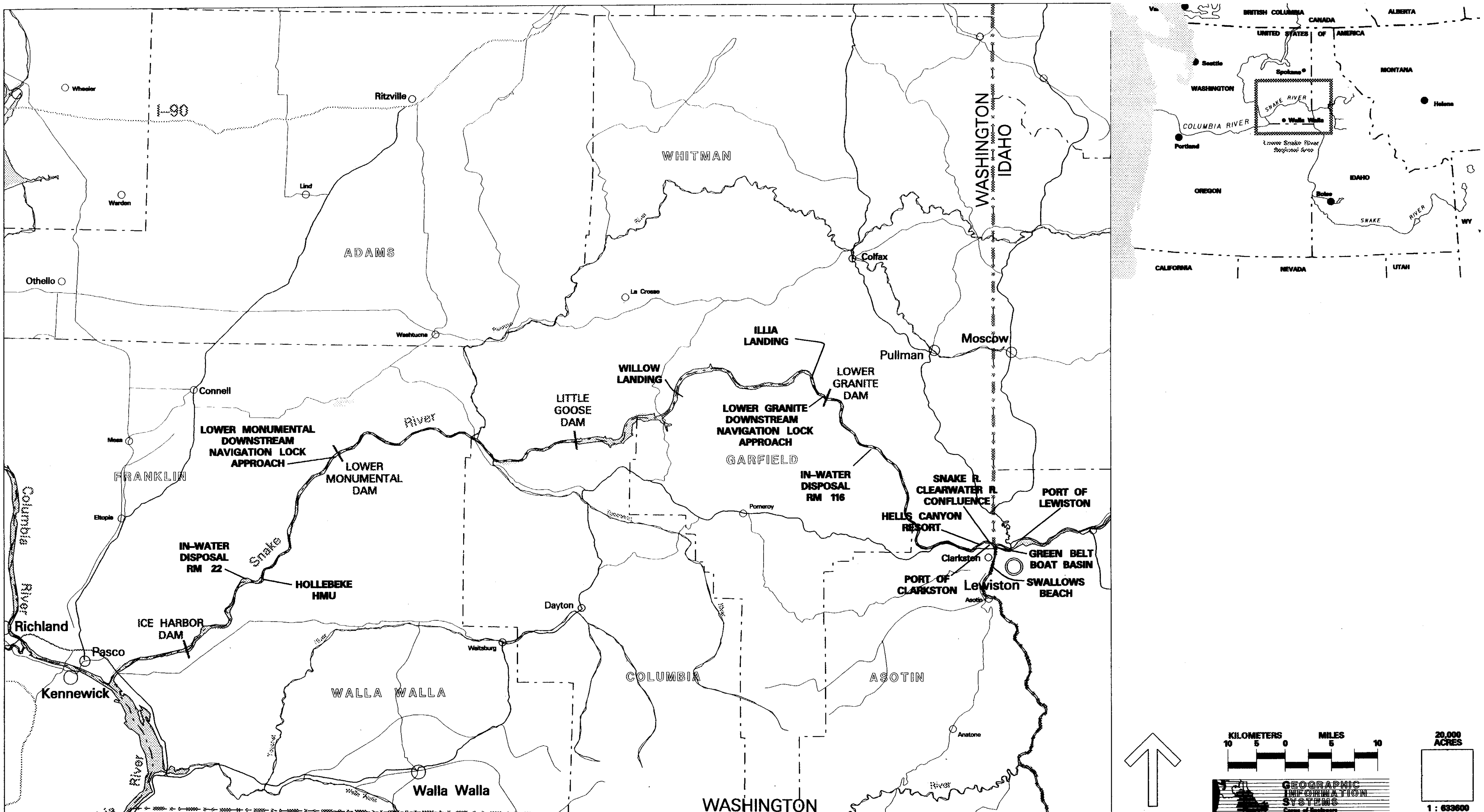

Walla Walla District

Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment

2000 – 2001 Dredging Plan

MISCELLANEOUS DREDGING AND DISPOSAL SITES

2000

PLATE 18

GIS Data Entry & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT) GIS Conversion: George Hardin (CENWW-PM-PD-E-AT) GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT) Study Manager: Blaise Grden (CENWW-PM-PD-E-AT)

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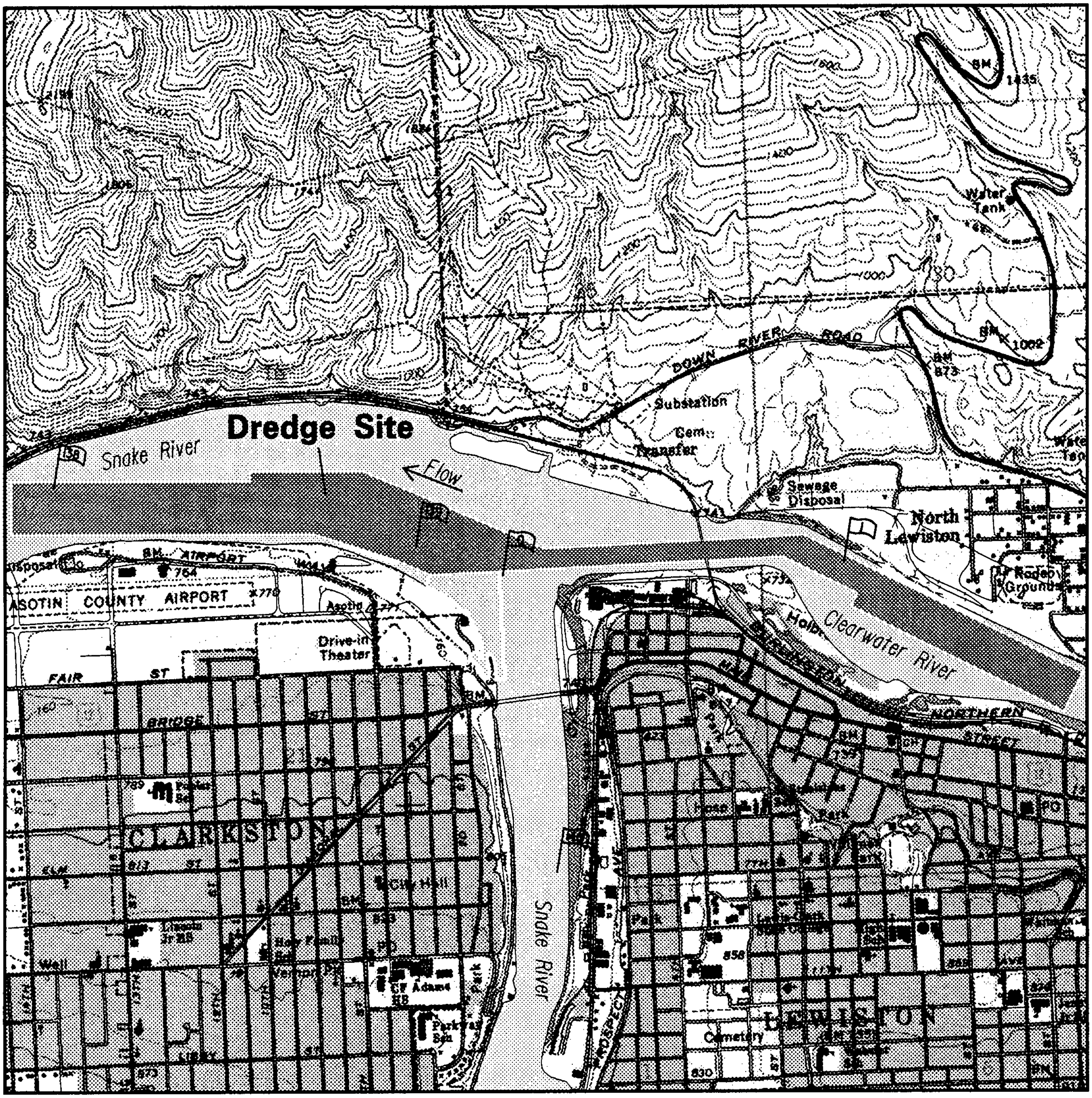

Sources:

Ice Harbor, Lower Monumental, Little Goose and Lower Granite Lock and Dams, Snake River, Clearwater River, Washingto and Idaho, Miscellaneous Dredging Sites, Dredging Plan, 13 Aug. 2000

METERS 300 100 0 FEET 500 1000 2000

20 ACRES 10 5

1 : 24,000

GEOGRAPHIC INFORMATION SYSTEMS Corps of Engineers Walla Walla District

Clarkston, WA. USGS 7.5 Minute Quadrangle. Township 11 N, Range 46 E.

Walla Walla District

Lower Snake River Reservoirs and McNary Reservoir Interim Dredging Environmental Assessment

2000 – 2001 Dredging Plan

SNAKE AND CLEARWATER CONFLUENCE SITE

GIS Analysts & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT)
GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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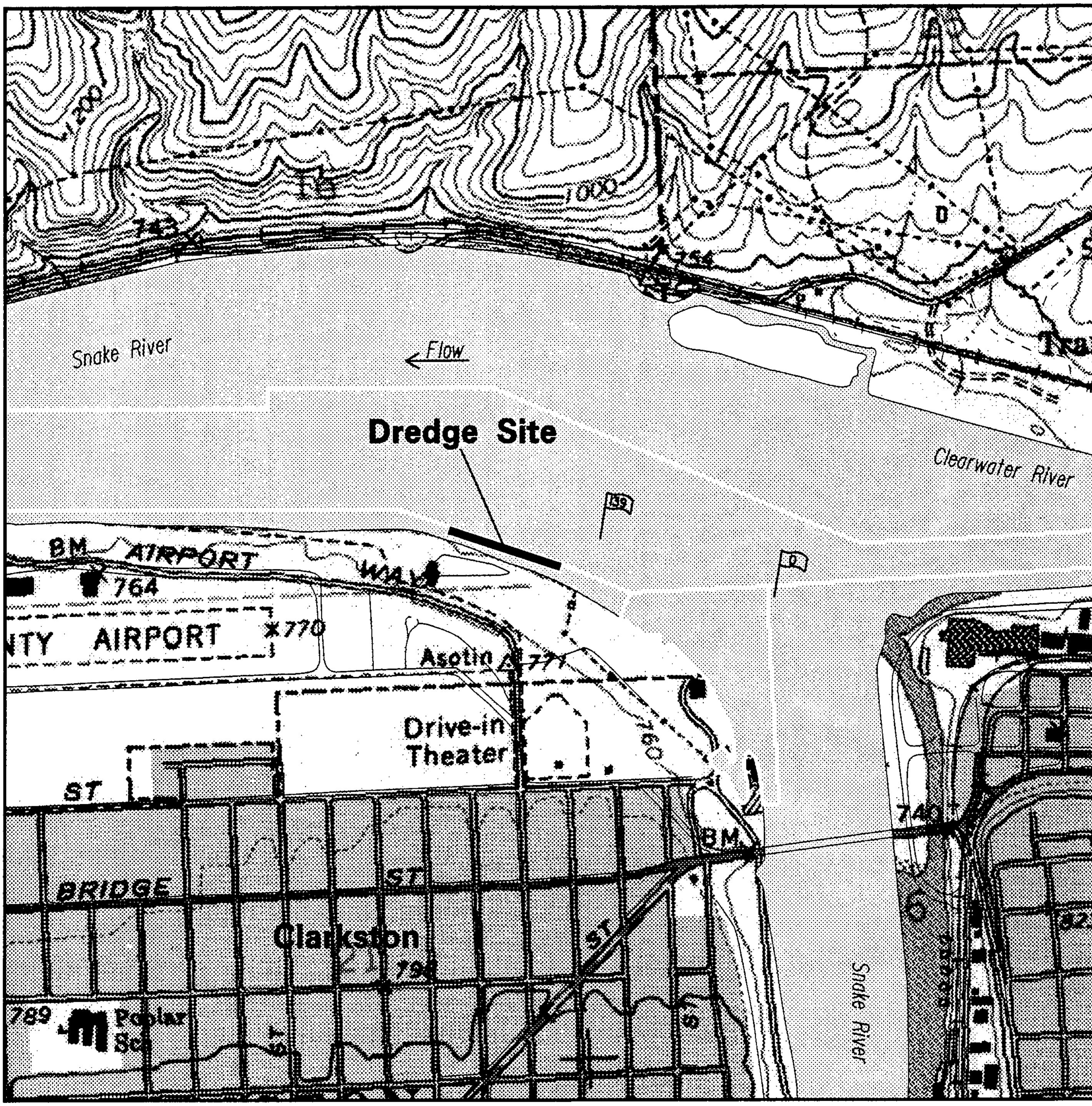
2000

PLATE 19



Sources:

Ice Harbor, Lower Monumental, Little Goose and Lower Granite Lock and Dams, Snake River, Clearwater River, Washingto and Idaho, Miscellaneous Dredging Sites, Dredging Plan, 13 Aug. 2000.

METERS 150 0 FEET 500 1000

10 ACRES 2.5 5

1 : 24,000

GEOGRAPHIC INFORMATION SYSTEMS Corps of Engineers Walla Walla District

Clarkston, WA. USGS 7.5 Minute Quadrangle, Township 11 N, Range 46 E

Walla Walla District

Lower Snake River Reservoirs and McNary Reservoir Interim Dredging Environmental Assessment

2000 – 2001 Dredging Plan

PORT OF CLARKSTON SITE

2000 PLATE 20

GIS Analysts & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT)
GIS Applications Coordinator: Blaise Green (CENWW-PM-PD-E-AT)

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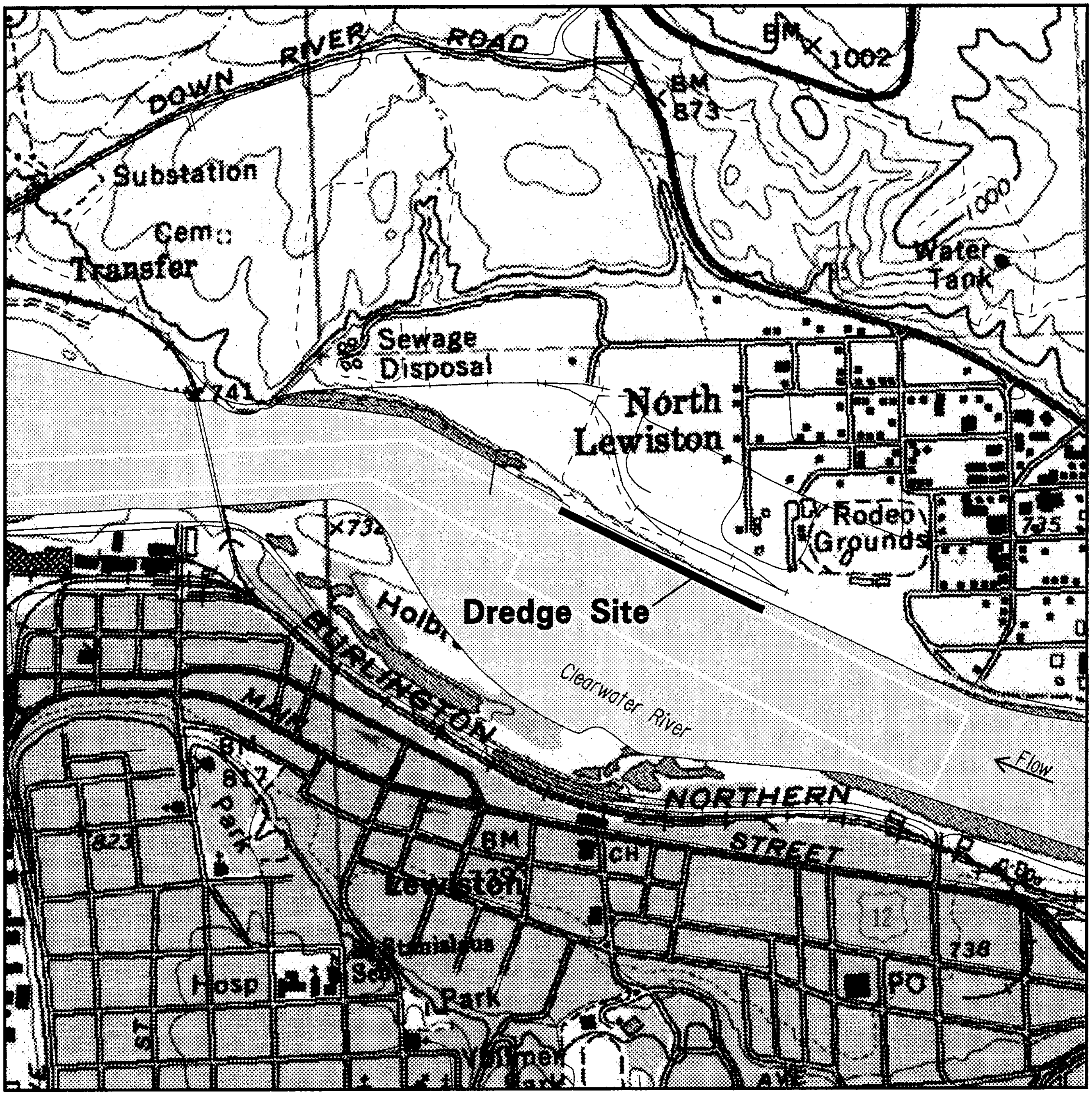

Sources:

Ice Harbor, Lower Monumental, Little Goose and Lower Granite Lock and Dams, Snake River, Clearwater River, Washingto and Idaho, Miscellaneous Dredging Sites, Dredging Plan, 13 Aug. 2000.

METERS 150 0 FEET 500 1000

10 ACRES 2.5 5

GEOGRAPHIC INFORMATION SYSTEMS Corps of Engineers Walla Walla District

1 : 24,000

Clarkston, WA. USGS 7.5 Minute Quadrangle, Township 11 N, Range 46 E.

Walla Walla District

Lower Snake River Reservoirs and McNary Reservoir Interim Dredging Environmental Assessment

2000 – 2001 Dredging Plan

PORT OF LEWISTON SITE

2000 PLATE 21

GIS Analysts & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT)
GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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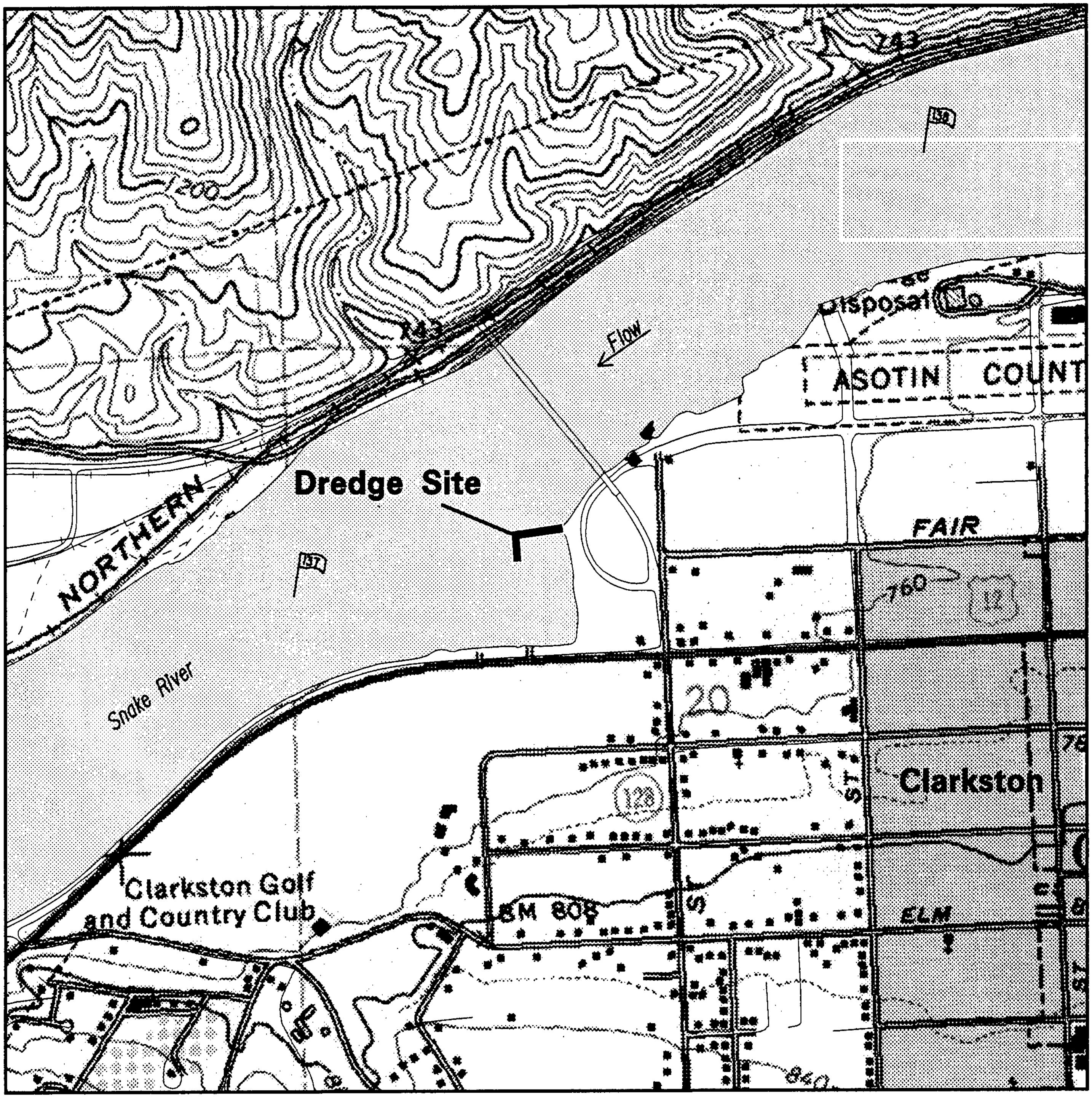
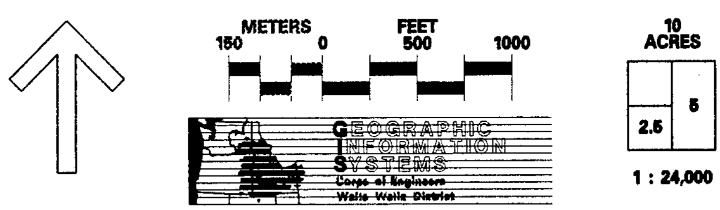


Sources:

Ice Harbor, Lower Monumental, Little Goose and Lower Granite Lock and Dams, Snake River, Clearwater River, Washingto and Idaho, Miscellaneous Dredging Sites, Dredging Plan, 13 Aug. 2000.



Clarkston, WA. USGS 7.5 Minute Quadrangle, Township 11 N, Range 46 E.

Walla Walla District

Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment

2000 – 2001 Dredging Plan

HELLS CANYON MARINA RESORT SITE

2000

PLATE 22

GIS Analysts & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT)
GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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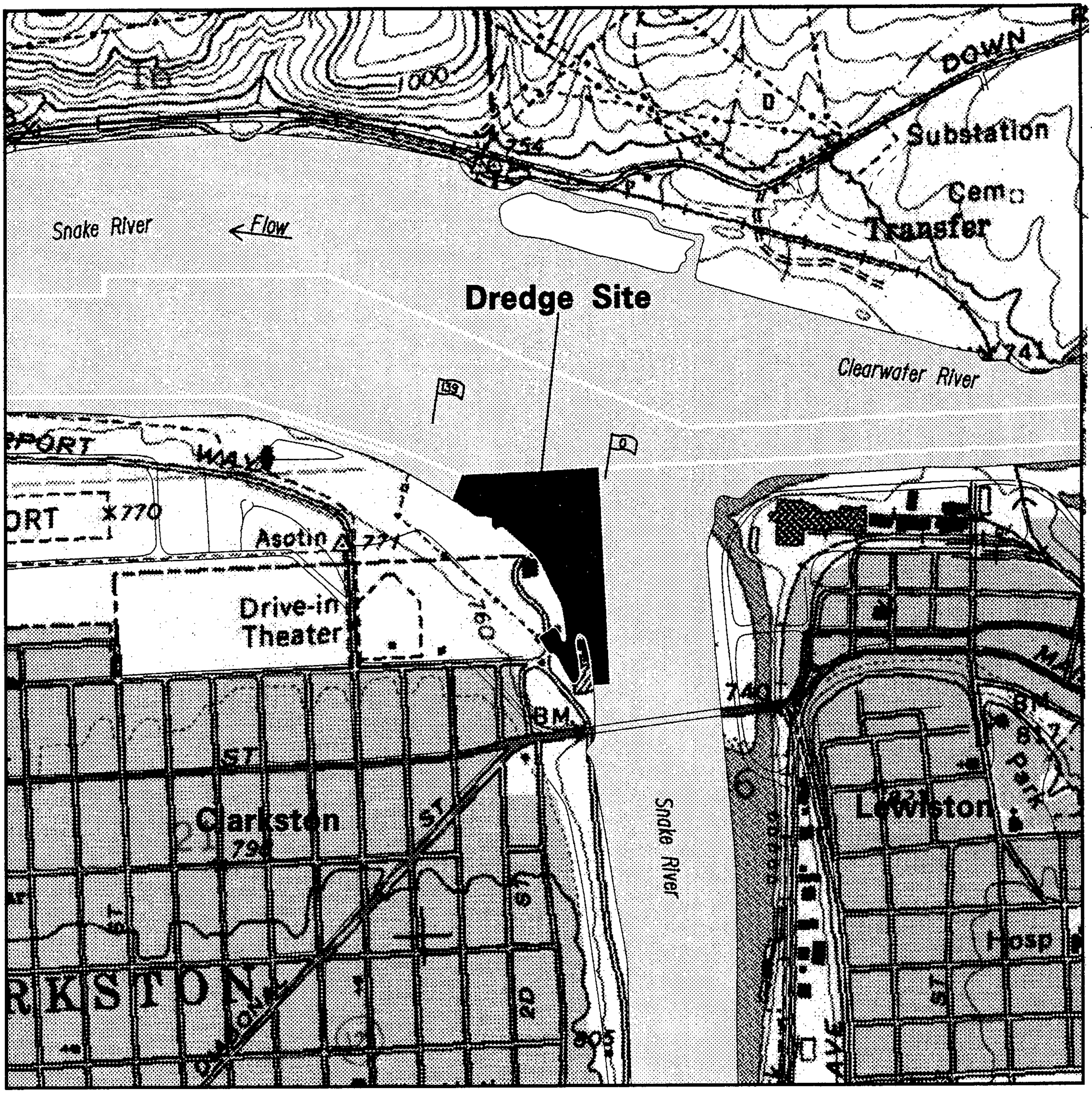

Sources:

Ice Harbor, Lower Monumental, Little Goose and Lower Granite Lock and Dams, Snake River, Clearwater River, Washingto and Idaho, Miscellaneous Dredging Sites, Dredging Plan, 13 Aug. 2000.

METERS 150 0 FEET 500 1000

10 ACRES 5 2.5

GEOGRAPHIC INFORMATION SYSTEMS Corps of Engineers Walla Walla District

1 : 24,000

Clarkston, WA. USGS 7.5 Minute Quadrangle, Township 11 N, Range 46 E.

Walla Walla District

Lower Snake River Reservoirs and McNary Reservoir Interim Dredging Environmental Assessment

2000 – 2001 Dredging Plan

GREEN BELT BOAT BASIN SITE

2000

PLATE 23

GIS Analysts & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT)
GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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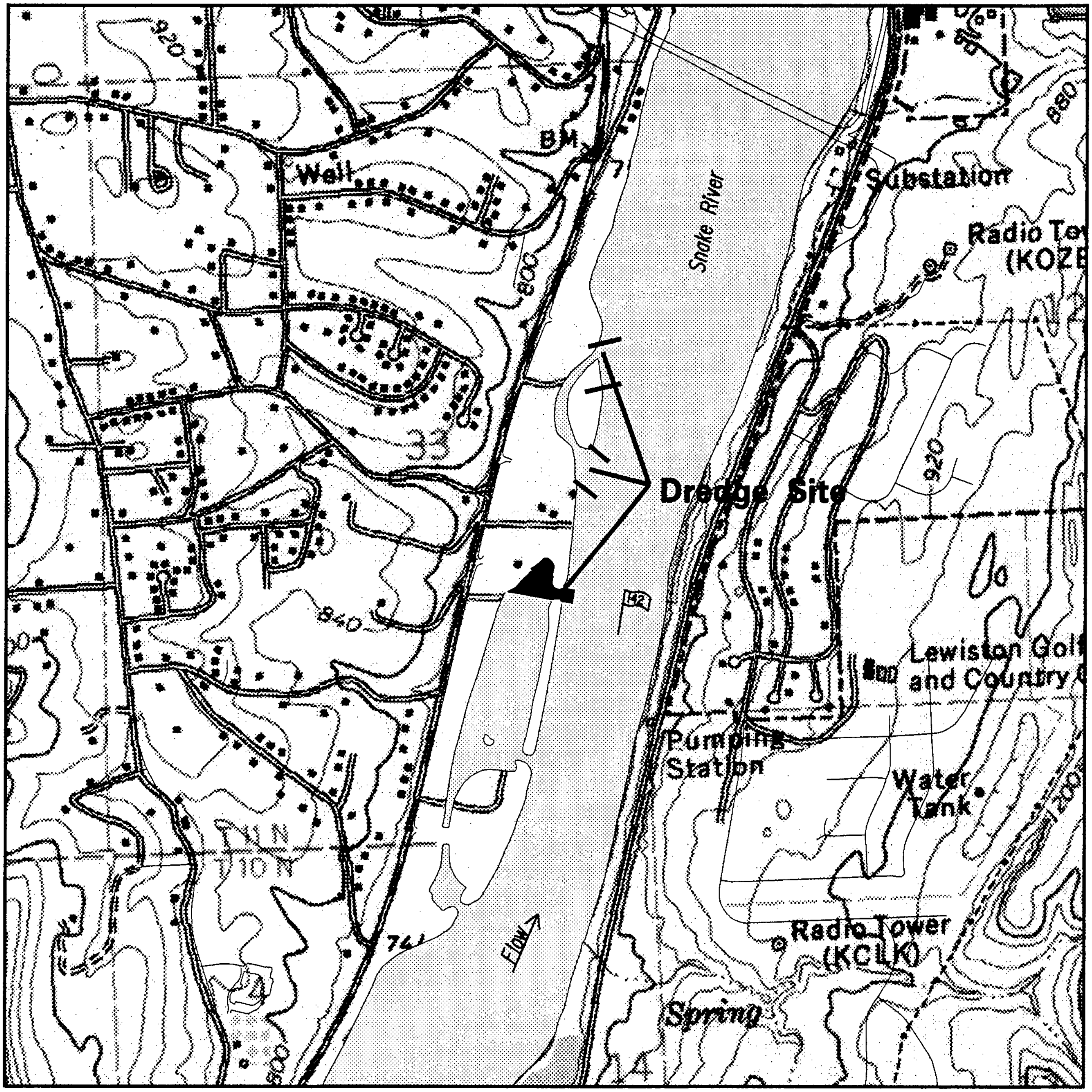

Sources:

Ice Harbor, Lower Monumental, Little Goose and Lower Granite Lock and Dams, Snake River, Clearwater River, Washingto and Idaho, Miscellaneous Dredging Sites, Dredging Plan, 13 Aug. 2000

METERS 150 0 FEET 500 1000

10 ACRES 2.5 5

GEOGRAPHIC INFORMATION SYSTEMS Corps of Engineers Walla Walla District

1 : 24,000

Clarkston, WA. USGS 7.5 Minute Quadrangle, Township 11 N, Range 46 E

Walla Walla District

Lower Snake River Reservoirs and McNary Reservoir Interim Dredging Environmental Assessment

2000 – 2001 Dredging Plan

SWALLOWS BEACH/ BOAT RAMP SITE

2000

PLATE 24

GIS Analysts & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT)
GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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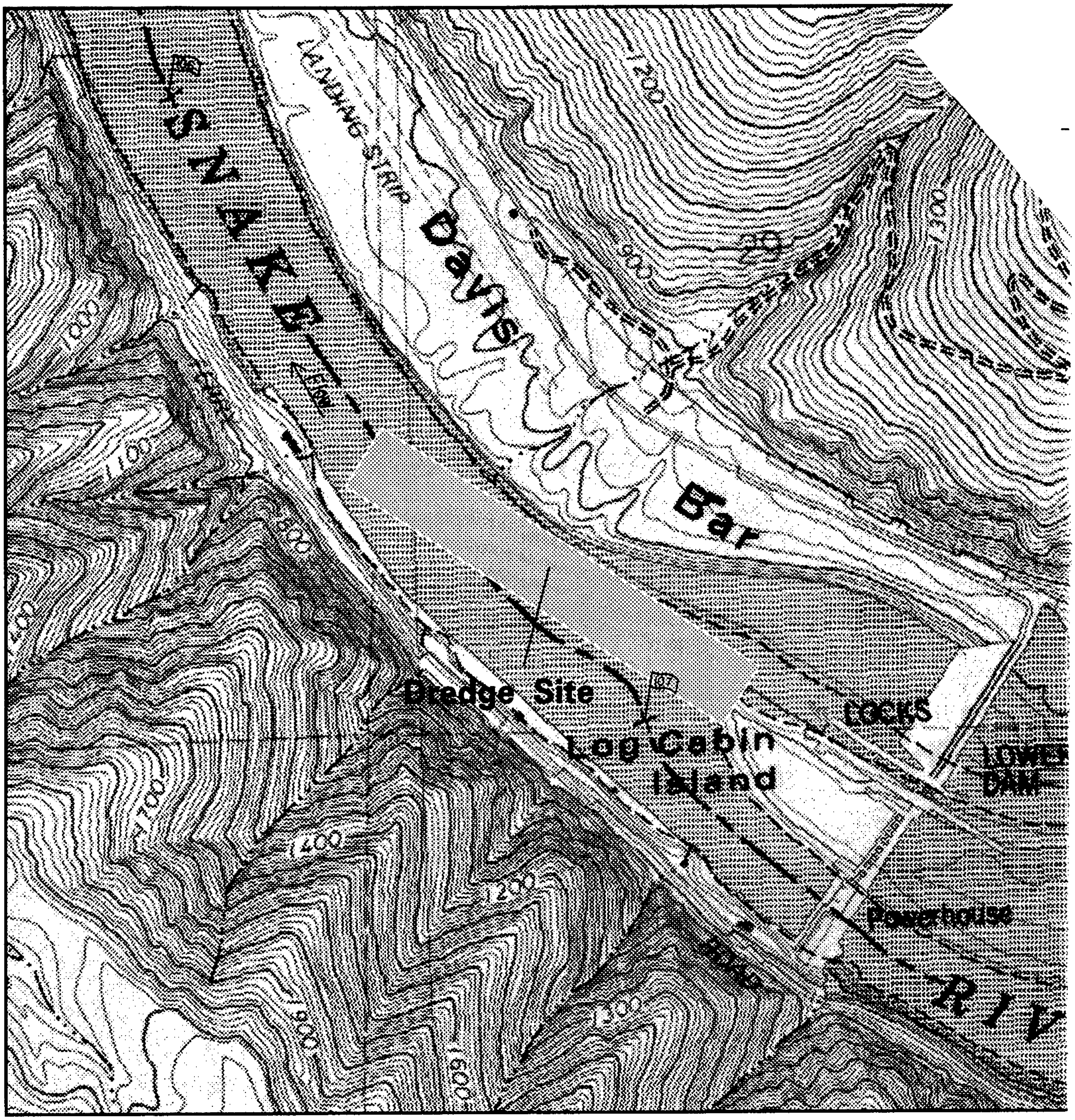

Sources:

Ice Harbor, Lower Monumental, Little Goose and Lower Granite Lock and Dams, Snake River, Clearwater River, Washingto and Idaho, Miscellaneous Dredging Sites, Dredging Plan, 13 Aug. 2000.

METERS 150 0 FEET 500 1000

GEOGRAPHIC INFORMATION SYSTEMS
Corps of Engineers
Walla Walla District

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Almota, WA. USGS 7.5 Minute
Quadrangle, Township 14 N, Range 43 E

Walla Walla Dist

Lower Snake River Reservoirs and McNary Res
Interim Dredging Environmental Asses

2000 – 2001 Dredging F

LOWER GRANITE DA
NAVIGATION LOCK SI

GIS Analysts & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT)
GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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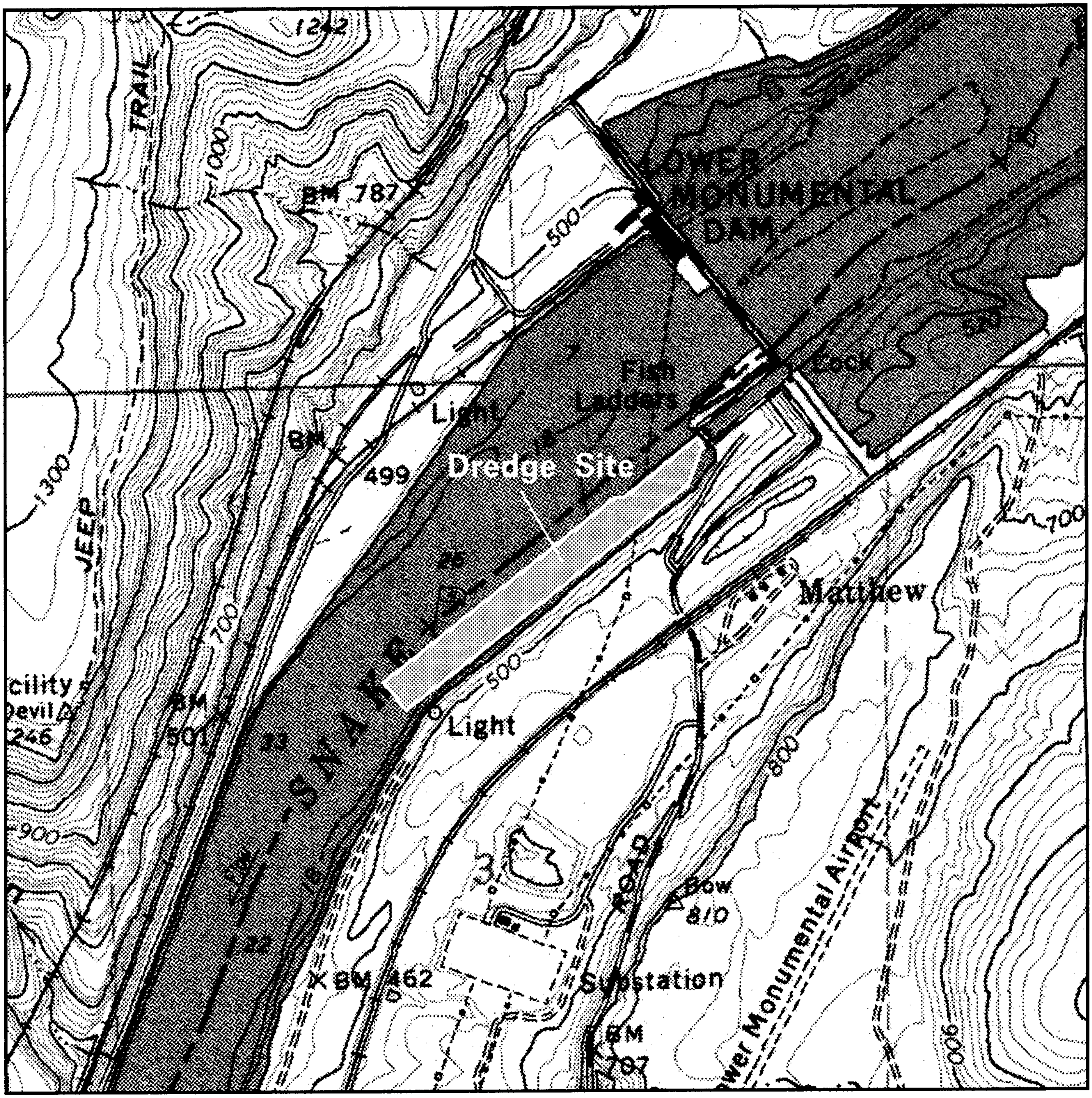
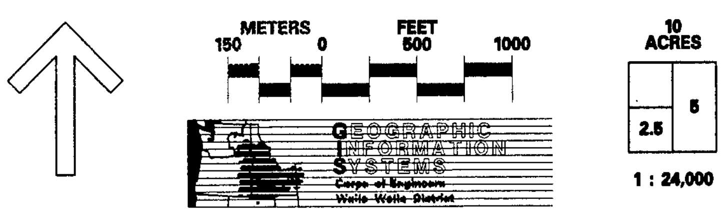


Sources:

Ice Harbor, Lower Monumental, Little Goose and Lower Granite Lock and Dams, Snake River, Clearwater River, Washingto and Idaho, Miscellaneous Dredging Sites, Dredging Plan, 13 Aug. 2000.



Lower Monumental Dam, WA. USGS 7.5 Minute Quadrangle, Township 12 N Range 34 E.

Walla Walla District

Lower Snake River Reservoirs and McNary Reservoir Interim Dredging Environmental Assessment

2000 – 2001 Dredging Plan

LOWER MONUMENTAL NAVIGATION LOCK SITE

2000

GIS Analysts & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT)
GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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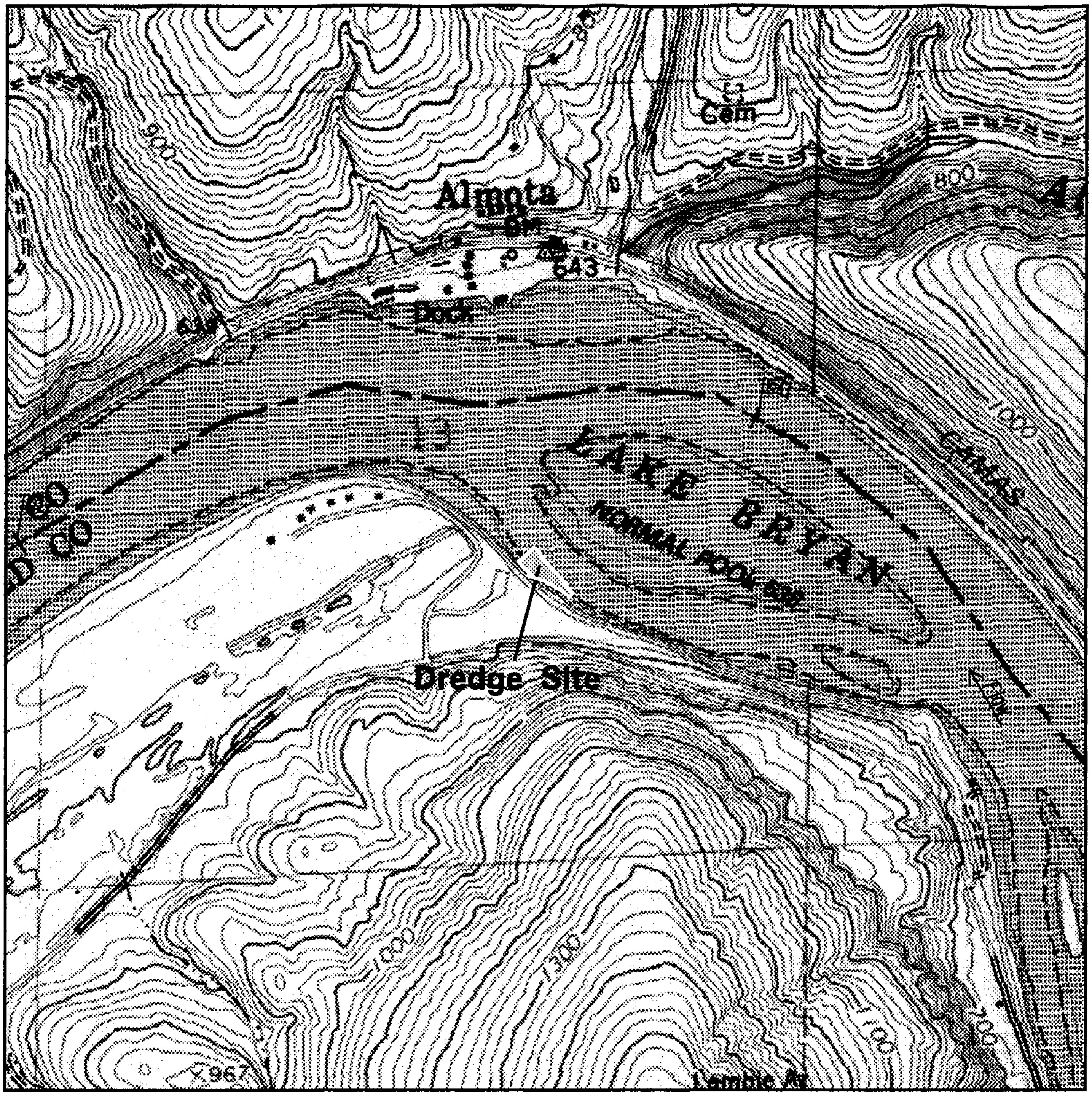
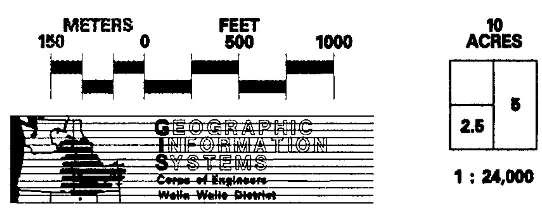


Sources:

Ice Harbor, Lower Monumental, Little Goose and Lower Granite Lock and Dams, Snake River, Clearwater River, Washingto and Idaho, Miscellaneous Dredging Sites, Dredging Plan, 13 Aug. 2000.



Almota, WA. USGS 7.5 Minute Quadrangle, Township 14, Range 43 E.

Walla Walla District
Lower Snake River Reservoirs and McNary Reservoir Interim Dredging Environmental Assessment

2000 – 2001 Dredging Plan

ILLIA LANDING BOAT RAMP SITE

2000

PLATE 27

GIS Analysts & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT)
GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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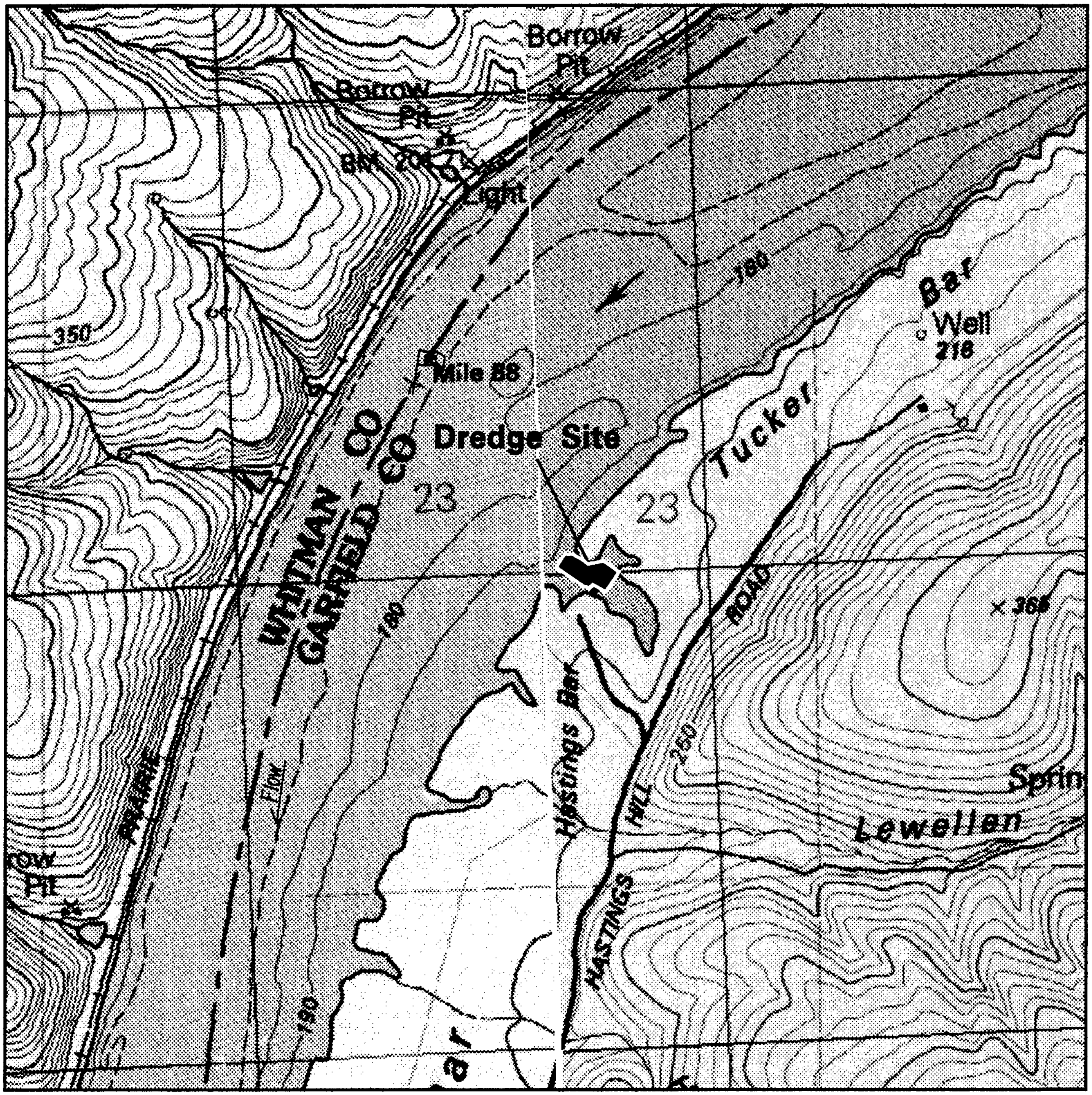

Sources:

Ice Harbor, Lower Monumental, Little Goose and Lower Granite Lock and Dams, Snake River, Clearwater River, Washingto and Idaho, Miscellaneous Dredging Sites, Dredging Plan, 13 Aug. 2000.

METERS 150 0
FEET 500 1000

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GEOGRAPHIC INFORMATION SYSTEMS
Corps of Engineers
Walla Walla District

1 : 24,000

Central Ferry and Ping, WA. USGS 7.5 Minute Quadrangles, Township 14 N, Range 40 E.

Walla Walla District

Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment

2000 – 2001 Dredging Plan

WILLOW LANDING BOAT RAMP SITE

2000

PLATE 28

GIS Analysts & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT)
GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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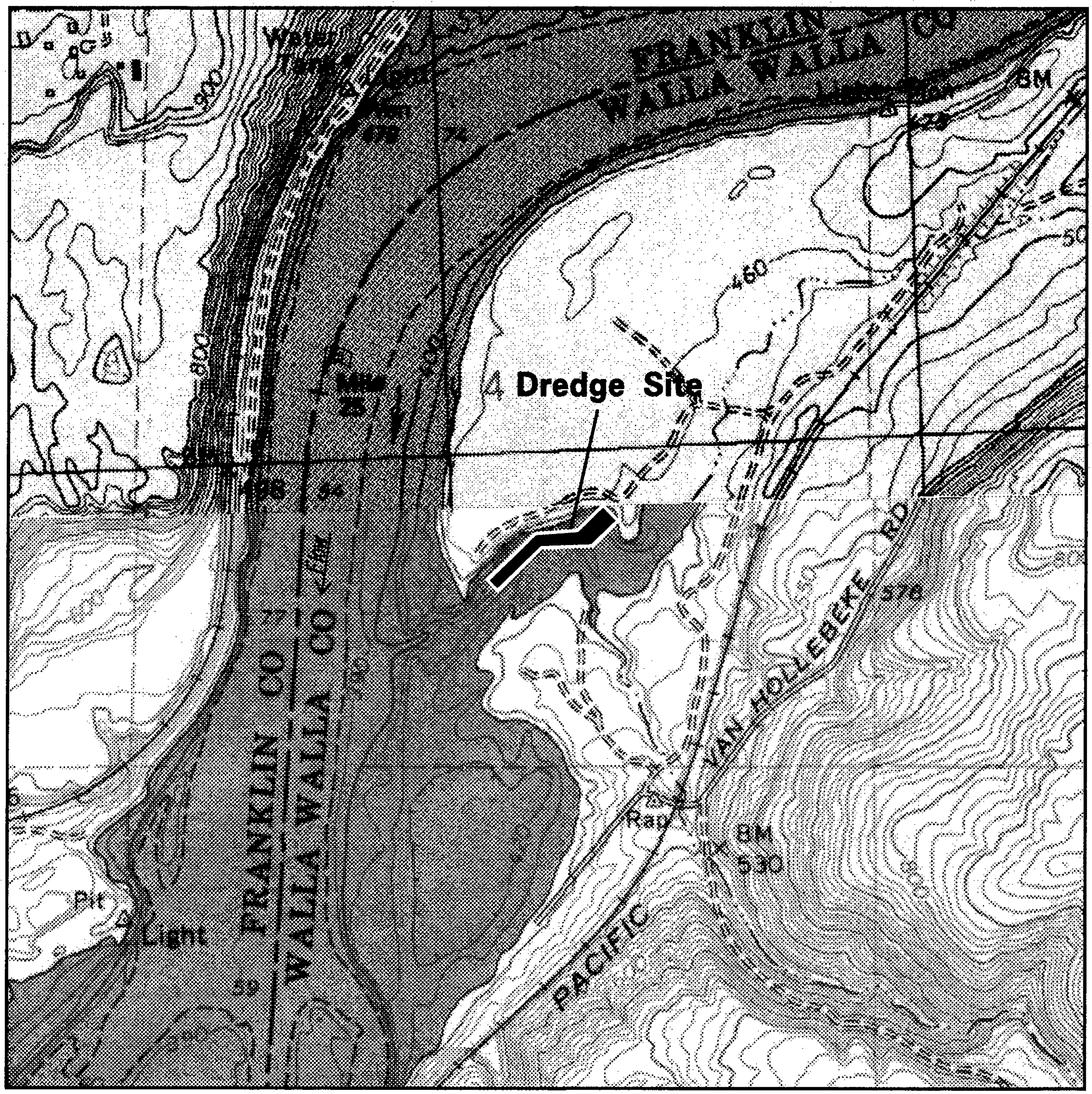

Sources:

Ice Harbor, Lower Monumental, Little Goose and Lower Granite Lock and Dams, Snake River, Clearwater River, Washingto and Idaho, Miscellaneous Dredging Sites, Dredging Plan, 13 Aug. 2000.

METERS 150 0 FEET 500 1000

10 ACRES 5 2.5

1 : 24,000

GEOGRAPHIC INFORMATION SYSTEMS
Corps of Engineers
Walla Walla District

Page and Snake River, WA. USGS 7.5 Minute Quadrangles, Township 10 N, Range 33 E.

Walla Walla District
Lower Snake River Reservoirs and McNary Reservoir
Interim Dredging Environmental Assessment

2000 – 2001 Dredging Plan

HOLLEBEKE HMU SITE

GIS Analysts & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT)
GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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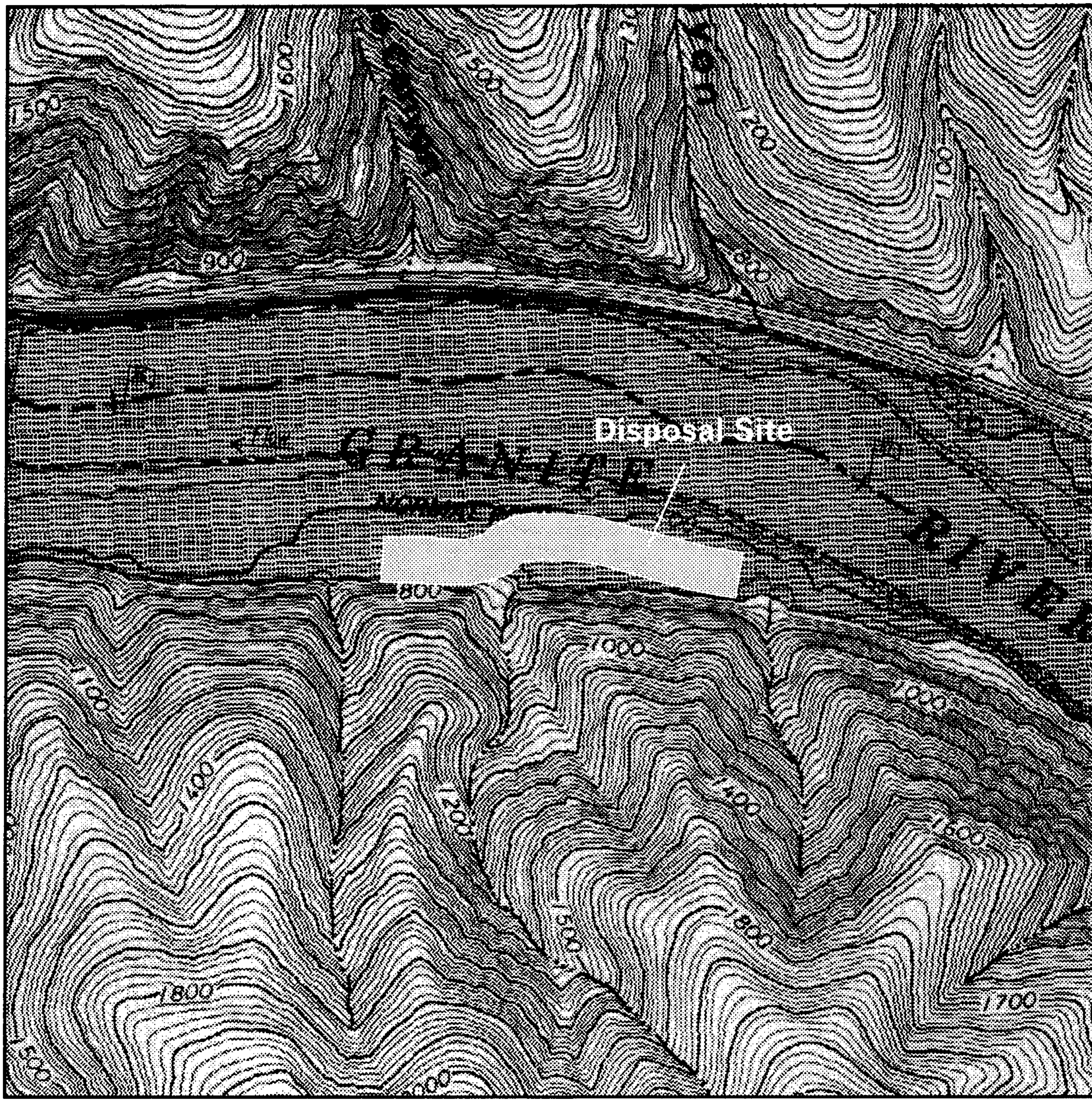
2000

PLATE 29



Sources:

Ice Harbor, Lower Monumental, Little Goose and Lower Granite Lock and Dams, Snake River, Clearwater River, Washingto and Idaho, Miscellaneous Dredging Sites, Dredging Plan, 13 Aug. 2000.

Granite Point, WA. USGS 7.5 Minute Quadrangle, Township 13 N, Range 44 E.

METERS 150 0 FEET 500 1000

10 ACRES 5 2.5

1 : 24,000

GEOGRAPHIC INFORMATION SYSTEMS Corps of Engineers Walla Walla District

Walla Walla District

Lower Snake River Reservoirs and McNary Reservoir Interim Dredging Environmental Assessment

2000 – 2001 Dredging Plan

IN-WATER DISPOSAL SITE, RM 116

2000

PLATE 30

GIS Analysts & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT)
GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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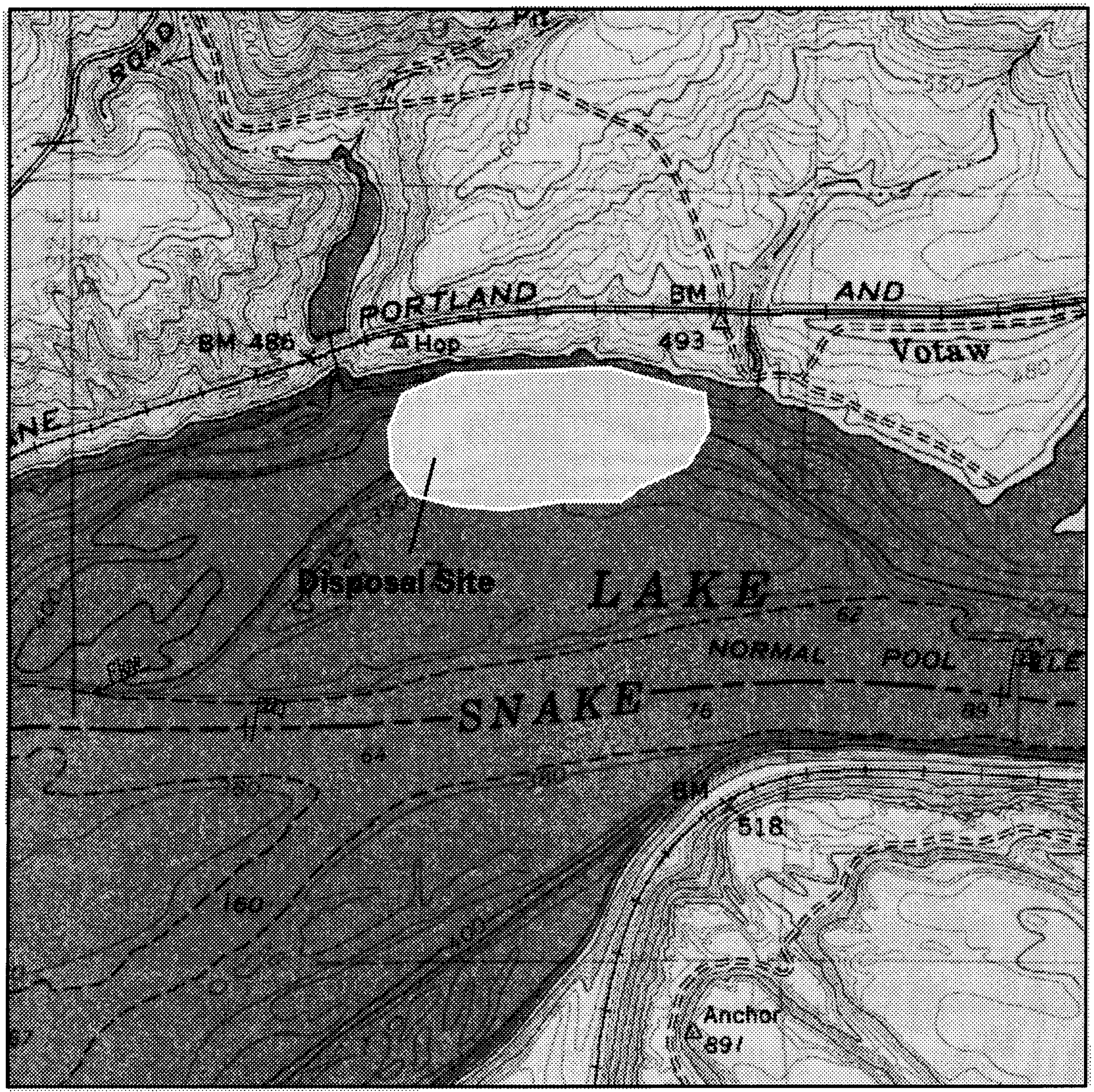

Sources:

Ice Harbor, Lower Monumental, Little Goose and Lower Granite Lock and Dams, Snake River, Clearwater River, Washingto and Idaho, Miscellaneous Dredging Sites, Dredging Plan, 13 Aug. 2000.

METERS 150 0 FEET 500 1000

10 ACRES 5 2.5

GEOGRAPHIC INFORMATION SYSTEMS Corps of Engineers Walla Walla District

1 : 24,000

Page, WA. USGS 7.5 Minute Quadrangle, Township 10 N, Range 33 E.

Walla Walla District

Lower Snake River Reservoirs and McNary Reservoir Interim Dredging Environmental Assessment

2000 – 2001 Dredging Plan

IN-WATER DISPOSAL SITE, RM 22

GIS Analysts & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT)
GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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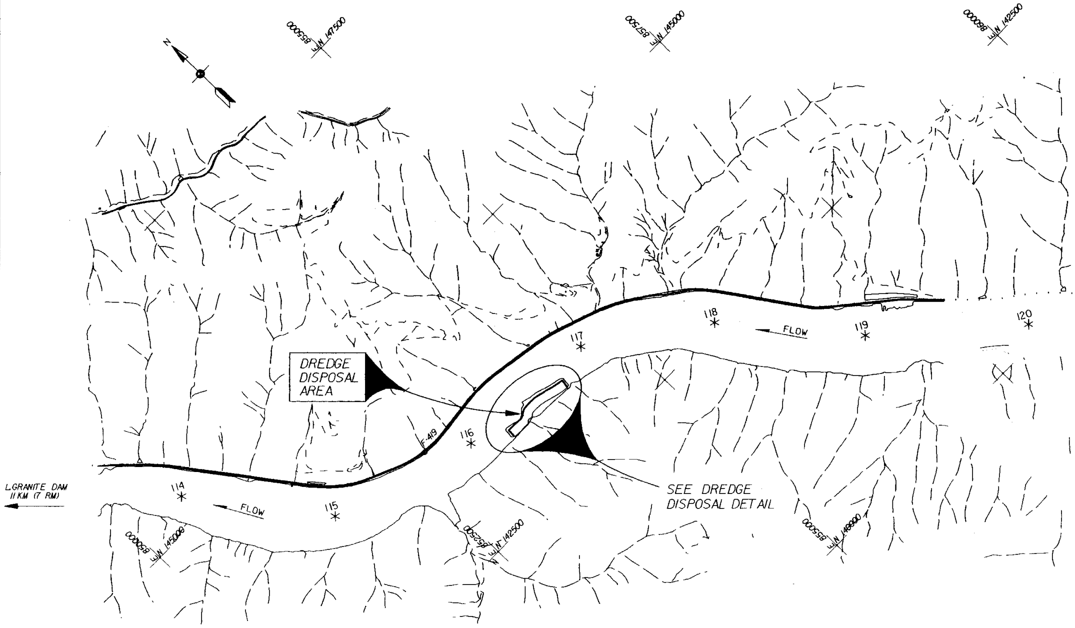
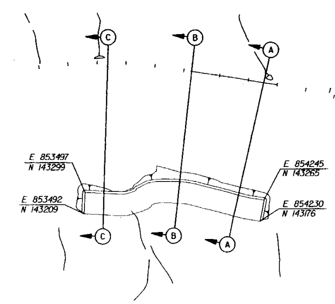
2000

PLATE 31



DREDGE DISPOSAL SITE - PLAN

SCALE IN METERS 0 300 600 1500 1:30000



DREDGE DISPOSAL - DETAIL

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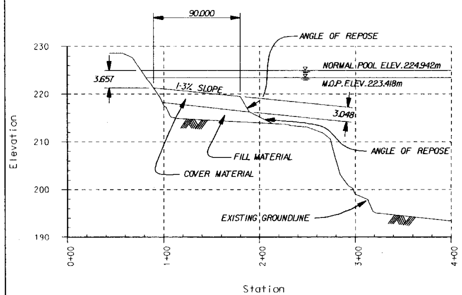

SECTION A

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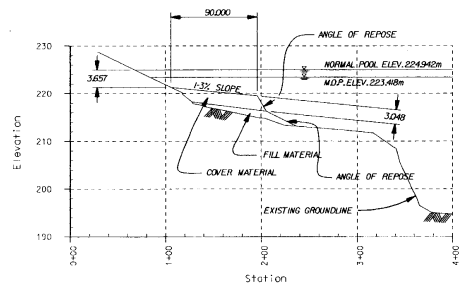
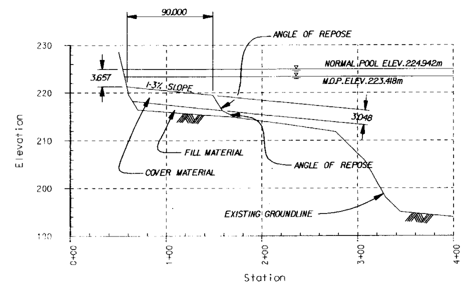
0 10 20 1:600 VERTICAL



SECTION B

0 75 150 1:3000 HORIZONTAL

0 10 20 1:600 VERTICAL



SECTION C

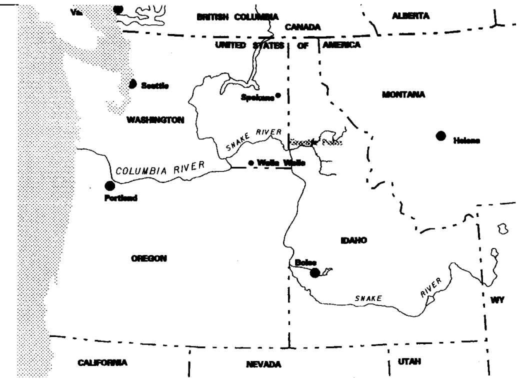
0 75 150 1:3000 HORIZONTAL

0 10 20 1:600 VERTICAL

LEGEND

⊙ F-419 BM MONUMENT

NOTES: 1. UNLESS OTHERWISE NOTED, DIMENSIONS ARE SHOWN IN METERS.



Sources:

Ice Harbor, Lower Monumental, Little Goose and Lower Granite Lock and Dams, Snake River, Clearwater River, Washington and Idaho, ... Dredging Sites, Dredging Plan, 13 Aug. 2000

Granite Point, WA, USGS 7.5 Minute Quad.

GEOGRAPHIC INFORMATION SYSTEMS Corps of Engineers Walla Walla District

Walla Walla District

Lower Snake River Reservoirs and McNary Reservoir Interim Dredging Environmental Assessment

2000 – 2001 Dredging Plan

IN-WATER DISPOSAL SITE, RM 116

PLATE 32

GIS Data Entry & Graphic Assembly: Applied Technology Team (CENWW-PM-PD-E-AT) GIS Conversion: George Hardin (CENWW-PM-PD-E-AT) GIS Applications Coordinator: Blaise Grden (CENWW-PM-PD-E-AT)

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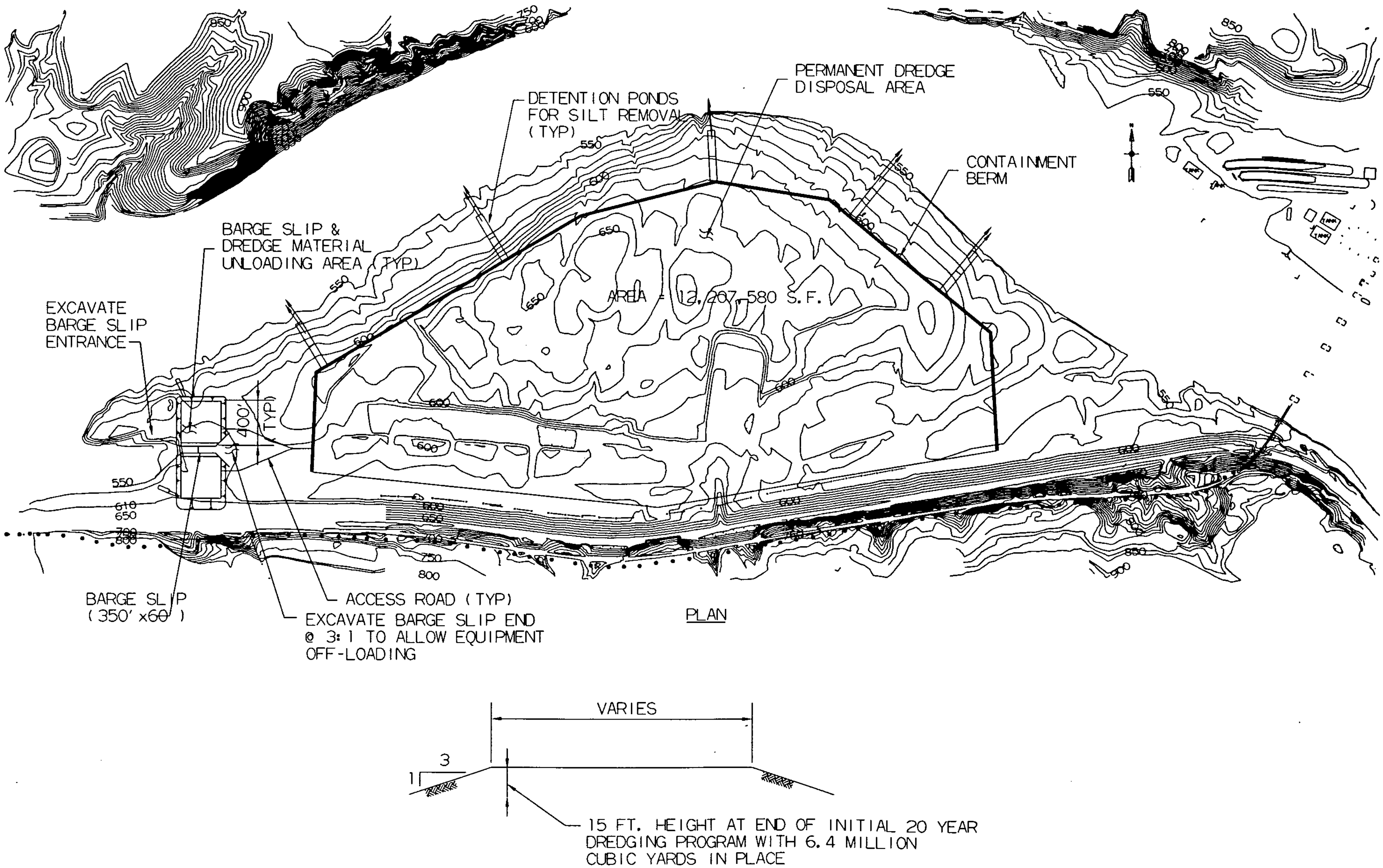
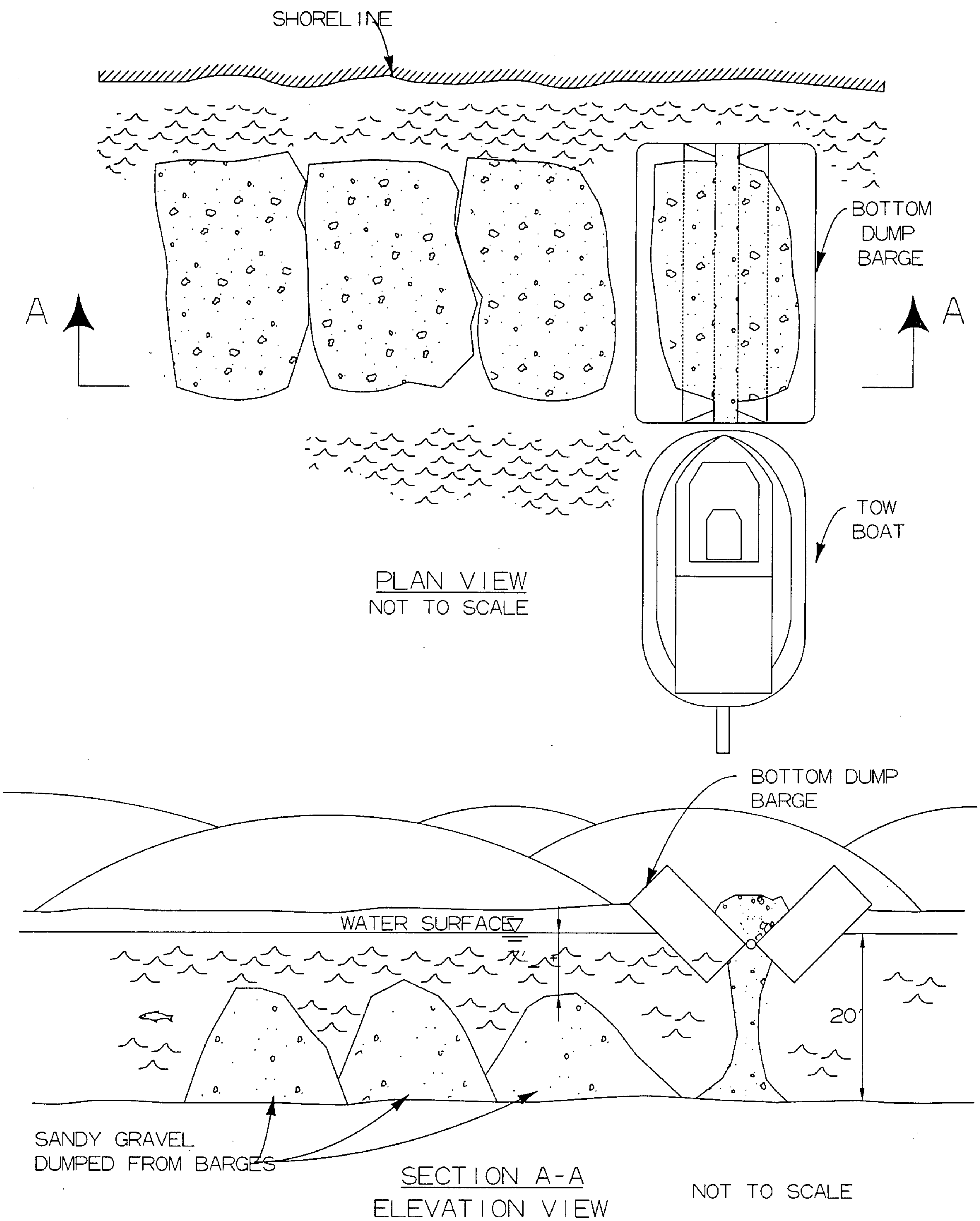


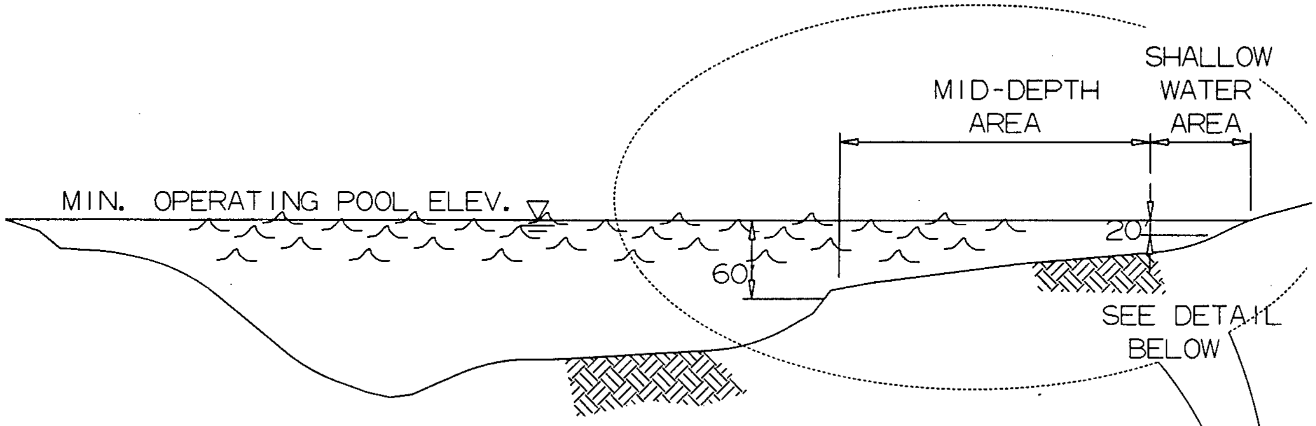
FILL CROSS SECTION
NOT TO SCALE

FIGURE 1, JOSO DREDGED MATERIAL DISPOSAL SITE

NOT TO SCALE

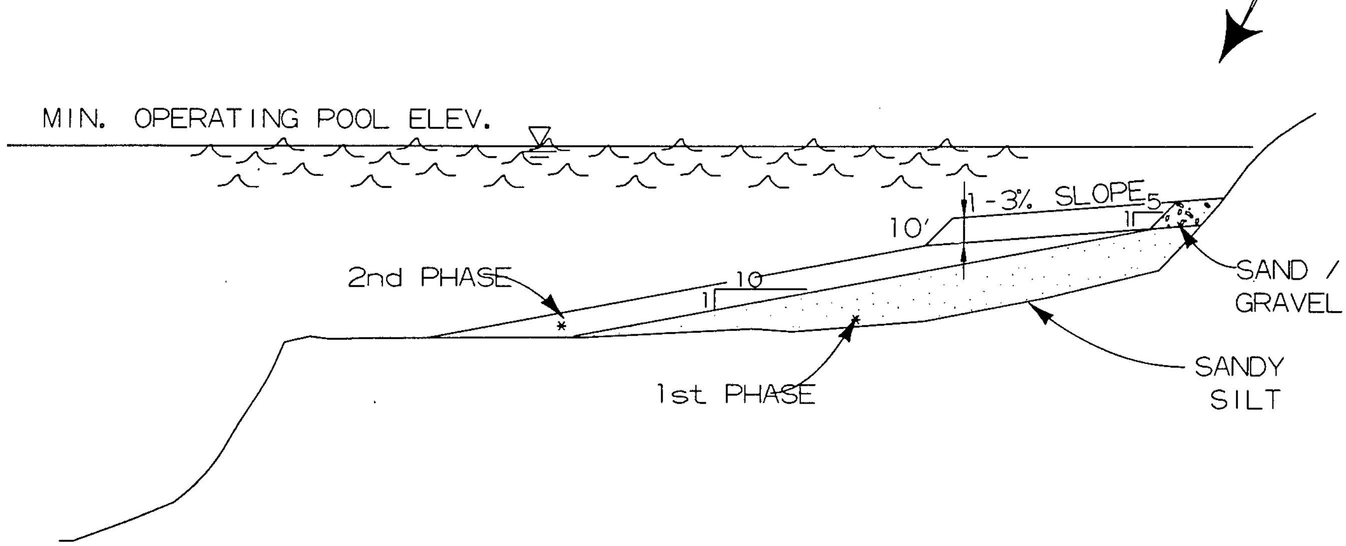


SHALLOW WATER DISPOSAL - BOTTOM DUMP PROCESS
FIGURE 2



TYPICAL CROSS SECTION
NOT TO SCALE

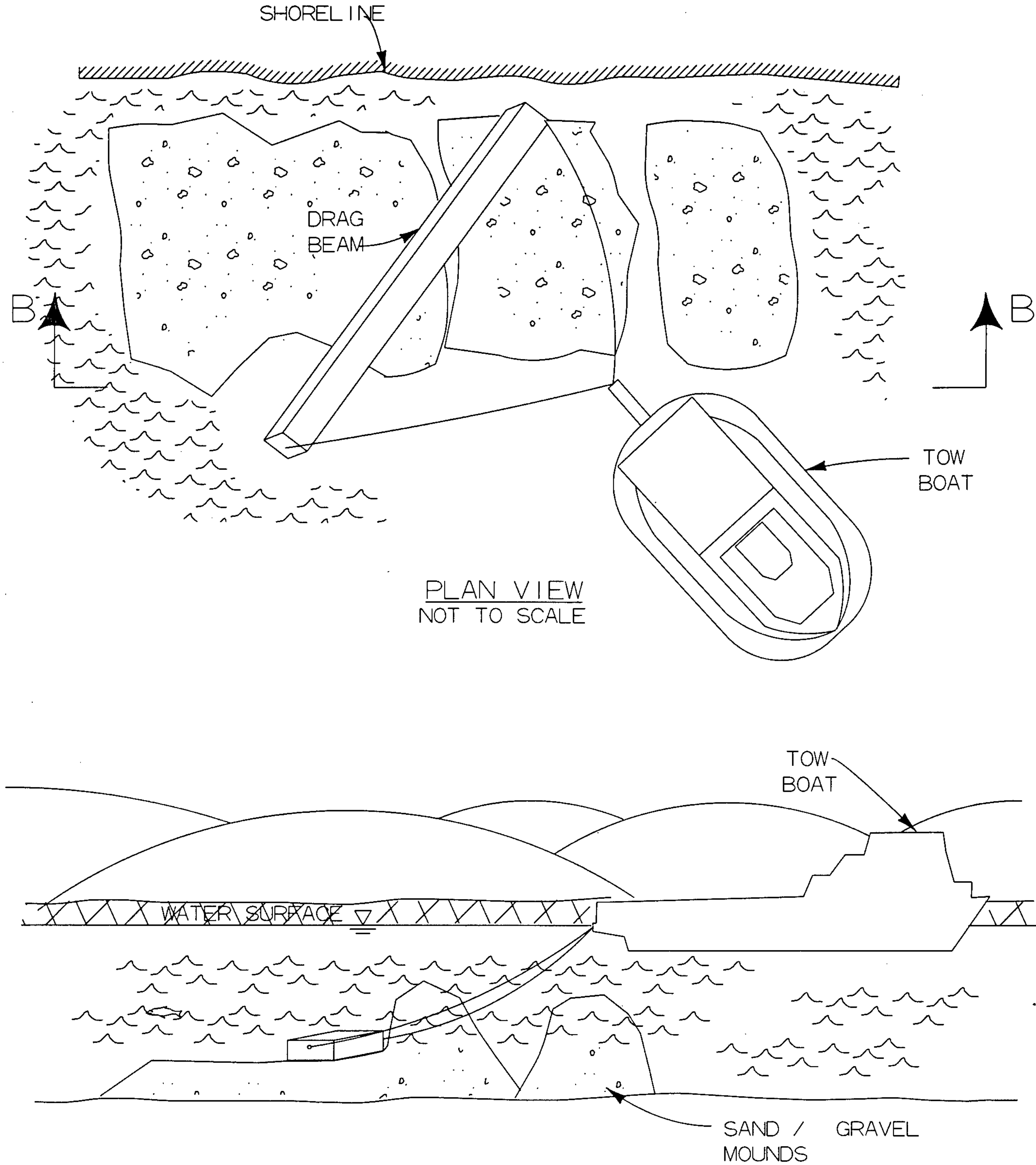
LOWER SNAKE RIVER RESERVOIR
SHALLOW & MID DEPTH DISPOSAL AREAS



DETAIL
NOT TO SCALE

PHASED DEVELOPMENT DISPOSAL AREA
SHALLOW WATER HABITAT

SHALLOW MID-DEPTH DISPOSAL
FIGURE 3



SECTION B-B
ELEVATION VIEW
NOT TO SCALE

SHALLOW WATER DISPOSAL - DRAG BEAM COUNTOURING PROCESS

FIGURE 4

Appendix A

Section 404(b)(1) Evaluation

APPENDIX A

2000-2001 LOWER SNAKE AND CLEARWATER RIVERS DREDGING SECTION 404 (b) (1) EVALUATION

1. PROJECT DESCRIPTION.

A. Location.

The lower Snake River is part of a navigation system composed of five reservoirs: Ice Harbor, Lower Monumental, Little Goose and Lower Granite Reservoirs, spanning the region from Tri-Cities, Washington east to Lewiston Idaho; and Mcnary reservoir which joins the Columbia River. These reservoirs are part of the Columbia/Snake river inland navigation system which the Corps of Engineers is authorized to maintain.

B. Description.

The Corps plans to dredge several areas of the lower Snake and Clearwater Rivers. The first is in Lower Granite reservoir at Clarkston, Washington /Lewiston, Idaho. The Corps plans to remove 183,120 cubic yards of sediment from the federal navigation channel at the confluence during the winter of 2000-2001. The area to be dredged extends from River Mile (RM) 138 on the Snake River to the confluence of the Snake and Clearwater Rivers at RM 139, then extends up the Clearwater River to just downstream of Memorial Bridge at RM 2. The federal navigation channel extends to within 50 feet of port structures and the Corps is responsible for maintaining this channel.

The Corps also plans to remove sediment from several other locations in the confluence area in 2000-2001. Two of these locations are port berthing areas – the Port of Clarkston at RM 139 on the Snake River, and the Port of Lewiston at RM 1 – RM 1.5 in the lower Clearwater Rive. The port areas parallel the federal channel and the ports are responsible for maintaining access from the federal channel. About 5,559 cubic yards of sediment would be removed from the Port of Clarkston and about 1,700 cubic yards would be removed from the Port of Lewiston. Both ports have signed memorandums of agreement with the Corps to dredge these areas and the ports will reimburse the Corps for the costs of dredging and disposal of the material removed from the port areas.

Additional areas to be dredged in the confluence area in 2000-2001 include the Greenbelt Boat Basin at RM 139.5 on the Snake River at Clarkston, and the Swallows Park swimming beach and Swallows Park boat launch (RM 141.7 and RM 141.9) on the Snake River at Clarkston. The Greenbelt Boat Basin is located behind the Corps' Clarkston Resources Office at the confluence and is maintained by the Corps for public recreation use. Swallows Park is located upstream of the confluence and is operated and maintained by the Corps. The Corps plans to remove 2,747 cubic yards of sediment from Greenbelt Boat Basin, 24,852 cubic yards of sediment from the Swallows swimming beach and Swallows boat launch. The Corps plans to dredge several other areas outside

of the confluence area in 2000-2001. Two of these are for navigation channel restoration, the downstream approach to Lower Granite Dam navigation lock RM 107 and the downstream approach to Lower Monumental Dam navigation lock RM 41.5. About 3,139 cubic yards of sediment would be removed from an area about 500 feet long by 200 feet wide downstream of the Lower Granite navigation lock guidewall. About 10,987 cubic yards would be removed from the Lower Monumental approach. This area is about 250 feet wide and extends about 2,300 feet downstream from the navigation lock.

There are also boat launch areas at three recreation sites that the Corps plans to dredge: Hells Canyon resort marina at RM 137, 3,532 cubic yards; the Corps operated Willow boat launch at RM 88, 3,924 cubic yards; and the Corps launch at RM 103.7, Illia Landing 1,439 cubic yards. There is also one irrigation intake at Hollebeke HMU RM 25 that requires sediment removal. The dredging at the intake may also involve dredging an access channel about 1,000 feet long from the Snake River to the intake. About 3,270 cubic yards of material would be removed at the Hollebeke site.

C. Purpose.

The purpose of the dredging is to restore the authorized depth of the navigation channel, and remove the sediment from the port areas. Additionally recreational benefits will be provided at boat launches and beaches. Wildlife management units will also benefit from sediment removal to keep pumps clear for irrigation to protect wildlife plantings.

D. Description of Dredged or Fill Material

(1). General Characteristics of Material.

The sediments to be removed range from predominantly sand out in the main channel to smaller particle sizes with some fine sand, silt and clay near the shorelines. Sieve analysis of sediment sites in the proposed dredge areas averaged 77 % sand, 18 % fines and 5% gravel. The material at Lower Granite and Lower Monumental navigation lock approaches is river cobble.

(2). Quantity of Material

Approximately 183,120 cubic yards of sediment will be dredged from the confluence, 7,259 cubic yards from the Lewiston and Clarkston Ports ports, and 39,764 cubic yards from the boat basins, marina basin, and the HMU intake. A total of 14,126 cubic yards of material will be removed from the two navigation lower lock approach sites.

(3). Source of Material.

The material to be dredged from the confluence originated from upstream in the Snake and Clearwater Rivers and consists of river sand and silt that eroded from the hills and mountainsides. Based on surveys and evaluations in the last 12 years, the surface materials of interest for this project were deposited in the Clarkston and Lewiston areas by both the Snake and Clearwater Rivers. U .S. Geological Survey measurements of sediment inflow during the period 1972 to 1979 indicate that approximately 10 percent of these sediments originated in the Snake River basin and 90 percent originated in the Clearwater River Basin.

E. Description of the Proposed Discharge Site.

(1). Location.

For all of the dredging except the for Lower Monumental Dam navigation lock approach, the disposal location would be at RM 116 in Lower Granite reservoir. This site is a shallow bench on the left bank of the Snake River just upstream of Knoxway Canyon. The Corps selected this site because it is close to the confluence (where most of the dredging would occur), could provide suitable resting/rearing habitat for juvenile salmon once the river bottom is raised, would not interfere with navigation, would not impact cultural resources, and is of sufficient size to accommodate dredged material disposal for several years.

The material removed from the Lower Monumental navigation lock approach would be disposed of at Lost Island HMU, which is located in the Ice Harbor reservoir on the right bank of the Snake River at RM 22-23. The site is on the downstream end of a river bar and was used as the disposal site for the 1998-1999 dredging of the same navigation lock approach. Water depth at the site is about 35 feet deep.

A contingency upland disposal site has been identified to provide storage for a portion of dredged material that may, for whatever reason, need to be deposited on a separate upland site. In the improbable event that dredged material may be unsuitable for beneficial use or disposal in-water, it would be isolated at the Joso upland disposal site (RM 56.5 - 56.8), and appropriate confinement measures would be taken to isolate this material (e.g. an impervious liner to prevent leaching of contaminated materials).

(2). Size

The footprint of the disposal area will be sized to contain the dredged material at RM 116 in Lower Granite reservoir.

(3). Type of Site.

The disposal area in Lower Granite reservoir is an in water site at RM 116. Lower Granite and the reservoir below Lower Monumental are run of the river impoundments therefore the sites are lacustrine/riverine in nature.

(4). Type of Habitat.

The general area of the Lower Granite disposal site is comprised of deep, mid and shallow water depths. This is a low velocity open water site. The shallower sections are targeted for fill material so a shallow water bench can be developed parallel to the shoreline. Current substrate consists of sand and silt. The sediment from the one site below Lower Monumental will consists of placing cobbles and rock on top of rock and cobble that had been previously placed at RM 22-23.

(5). Timing and Duration of Discharge.

The discharge will occur sometime during the window from December 15, 2000 through March 1, 2001.

F. Description of Method for Dredging and Placement of Materials.

The proposed dredging method has been left to the discretion of the contractor although restrictions have been placed on this selection. The contractor can elect to remove dredged sediments by selected mechanical means (i.e.; clamshell, backhoe. shovel/scoop or dragline.) No hydraulic or other methods will be allowed. The Corps has selected sediment samples from the areas to be dredged and has identified particle size percentages according to composition of silt, sand and coarser materials.

The sequence of dredged material disposal at RM 116 is designed to accomplish two goals: 1) create shallow water habitat for juvenile salmon, and 2) dispose of silt in a beneficial manner. Dr. David Bennett of the University of Idaho tested disposal of dredged materials in Lower Granite reservoir during the late 1980's and early 1990's. His studies indicated that disposing of sand and cobbles in mid-depth or shallow-water sites can be beneficial because it creates important fish habitat, especially for juvenile fall Chinook salmon.

Procedures would be to use fines/silt (less than 0.2 mm in diameter) in a mixture with sand and gravel/cobble to fill the mid-depth portion of the site and form a base embankment. The dredged material would be placed aboard bottom dump barges and analyzed to determine the percentage sand or silt. The barges would then proceed to the disposal area and would dump the material within the designated footprint close to the shoreline to raise the river bottom. The second step would be the placement of sand on top of the sand/silt embankment. The contractor would be directed to reserve an area of sand as his final dredging site. The contractor would use barges to dump the sand on top of the base embankment so a 10-foot thick layer of sand covers the embankment and the

water depth is about 10 feet deep. The footprint of the disposal area would be sized so that the maximum amount of shallow water sandy substrate habitat is created with the estimated quantities of material to be dredged. The third phase would be to use a beam drag to flatten and level the tops of the mounds to form a flat, gently sloping shallow area between 10 and 12 feet in depth.

Material removed from Lower Monumental Lock approach would be placed as close as possible to the upstream end of the disposal area at Lost Island HMU. This material will be dumped on top of an existing mound. The material would be composed of 1-6 inch cobbles and some larger rock. The contractor would continue to dispose of dredged material on top of the mound until the water was 15-20 feet deep. Material would then be dumped on the downstream slope of the mound to create an embankment parallel to the shoreline

2. FACTUAL DETERMINATIONS.

A. Physical Substrate Determinations

(1). Substrate Elevation and Slope.

The depth to which the substrate will be dredged depends on the dredging area. For the navigation channel and ports, the substrate will be lowered to a depth of 14-15 feet. The boat basin depths would be lowered to 6-8 feet. The irrigation intake would excavated to about 12 feet. The sides of the dredging areas will be sloped back to a 1v: 2h or the angle of repose to provide a stable slope face.

(2). Substrate Particle Size.

The Corps contracted with an EPA certified laboratory to determine content and particle size of 53 samples taken from June 2 –June 9, 2000 at and in the near vicinity of the proposed dredge sites. The contract specified dry weight testing only. Grain size charts and scales assign gravel as being particle sizes 4.75 mm and larger, sand from .075 to 4.75 mm and fines as less than .075 mm. Of the 53 samples average particle sizes were 5 percent gravel, 18 percent fines and 77 percent sand. Fines are more prevalent in the Lower Snake River boat basins and are associated with shallower water depths and less water movement.

Downstream lock approaches at Lower Granite and Lower Monumental Dams sediment samples were comprised of large rock substrate, and 1 to 6-inch cobbles. Based on the particle size, low surface area and substrate composition the Corps made the determination that little or no contamination (induced by contaminated water to cobble contact) would be expected therein.

(3). Dredged/Fill Material Movement.

There will likely be some movement of the sandy fill material as it settles out in the disposal area. Once the sand has settled, there will likely be some downstream movement along the edge bordered by the main river current. Silt would also be expected to be entrained in the water column and carried downstream as the material is released from the barge. However, past post-disposal surveys have shown that the material dredged from the confluence area falls to the bottom as a unit. There would be some downstream movement of the silt after it has reached the river bottom. The river cobbles from below Lower Granite Dam and Lower Monumental would not be expected to move a noticeable amount after disposal.

(4). Physical Effects on Benthos.

Some benthic organisms which inhabit the substrate within the dredging boundaries will be removed with the dredged material and killed. Benthic macroinvertebrate recolonization should generally occur within one year. However, annual disturbances (associated with natural and/or dredging events) will continue to affect recolonization efforts. Any benthic organisms inhabiting the disposal area would be buried by the dredged material. Recolonization should occur rapidly.

(5). Other Effects

No other effects are anticipated due to the proposed action.

(6). Actions Taken to Minimize Impacts.

All work will be conducted during the in-water work window of December 15 through March 1 to avoid any impact to migrating anadromous fish.

B. Chemical Description of Materials.

In addition to sampling particle size the Corps contracted for a series of analyses on samples collected in 2000 to determine chemical content of sediments at potential dredge sites in the Lower Snake River and the Snake and Clearwater River Confluence. Chemical tests included polynuclear aromatic hydrocarbons (PAH's), organophosphate pesticides, chlorinated herbicides, oil and grease, glyphosate, ampa, dioxin and metal analysis.

Results from herbicide and pesticide tests were below reportable laboratory detection testing levels. Polynuclear aromatic hydrocarbons and metal concentrations were below standards listed for the compounds listed in Washington's Department of Ecology Draft Sediment Standards June 1999. For the glyphosphate tests only one site located in the Green Belt Boat Basin at Clarkston showed glyphosate above lab detection limits at 23 parts per billion. Two other samples for glyphosate in the same boat basin came back

below reportable lab detection limits. Roundup herbicide had probably been sprayed at one specific location at this site. This compound is highly soluble and should biodegrade.

Twenty-four sites were sampled for dioxin with dioxin screen tests from the Confluence of the Snake and Clearwater downstream for several miles in Lower Granite Pool. Chlorinated furans and dioxin congeners have been detected in the past in these areas (1991, 1996, and 1998). This year's results showed 7 sites to contain some chlorine dioxin congeners. One is at the confluence and four sites on the left bank travelling downstream (river miles 139.1 and 138.4). High resolution gas chromatograph-mass spectrometric tests were performed as additional tests on these sites. The analysis shows no dioxin 2378-TCDD which is a regulated toxic category B chemical listed in the Washington Administrative Code. The results showed that the dioxins were less toxic forms and in minute quantities (parts per trillion).

Thirty-eight locations were sampled for oil and grease. Results varied from 41-770 parts per million. Only three of the samples exceeded 400 ppm and they were downstream from boat basins. Total organic carbon (TOC) testing was run on the oil and grease samples and the glyphosate sample that was above detection limits. TOC's for oil and grease averaged 1.2 % and ranged from 0 to 5.8 percent. Total organic carbon for the glyphosate sample was 1.6 percent. These sites all yielded concentrations of PAH chemicals below reportable lab detection limits. Oil and grease composition was probably from animal matter. TOC concentrations were also low in these areas. Based on these results the sediments should pose no problems for unconfined disposal.

B. Water Circulation, Fluctuation and Salinity Determinations.

(1). Water

(a). Salinity. Not Applicable.

(b). Water Chemistry - Naturally occurring chemical substances that may increase basic loading to the water column will occur as a result of re-suspension of sediments at the dredging and off-loading disposal areas. The increased chemical load will become diluted in the mixing zone, and should not have a significant impact on the aquatic environment. Small increases in the pH and alkalinity are expected for short periods. No permanent change is expected.

(c). Clarity - Turbidity increases would occur in the immediate vicinity of the proposed dredging areas and the disposal area in Lower Granite reservoir. A small turbidity increase may occur at the Lost Island HMU disposal site. Sediments, re-suspended during dredging of the navigational areas, will cause a plume of turbid water downstream of the activity. Based on previous dredging activities in the confluence area, the zone of turbidity is not expected to constitute more than 15 percent of the river width nor extend downstream more than 300 meters (984 feet). Any decrease in clarity would be short-term and will quickly dissipate. The dredging below the Lower Granite

navigation lock may cause some short-term turbidity. The rock removal below Lower Monumental Lock approach would create little turbidity.

(d). Color - Water color in the immediate vicinities of the dredging and disposal operations will be altered as brownish plumes are expected. Due to regulation and monitoring these plumes will be of minimal size and duration.

(e). Odor - No effect.

(f). Taste - There are no known municipal or private water supply intakes downstream of the dredging or disposal sites, thus taste is not a relevant factor.

(g). Dissolved Gas Levels - The resuspension of sediments may cause a slight reduction in dissolved oxygen levels.

(h). Nutrients - Disturbance of sediments during removal and dissolution during disposal may increase water column concentrations of inorganic and inorganic nutrients. Rapid dilution would occur.

(i). Eutrophication - No effect

(j). Others - No effect.

(2). Current Patterns and Circulation.

(a). Current Pattern and Flow - Flow patterns in the area would not be altered during the dredging project. However, once dredging is completed, flows in the Swallows Park swimming area would change.

(b). Velocity - The post-project velocities are not expected to be markedly different from pre-project flows. However, slight changes will result from somewhat shallower water depths in the immediate vicinities of the disposal areas.

(c). Stratification - The reservoirs do not typically stratify annually due to their large size and high exchange rate of water. No effect is anticipated.

(d). Hydrologic Regime - No effect.

(3). Normal Water Fluctuations

Normal water level fluctuations in the reservoirs are controlled at the dams. The proposed project will have no effect on reservoir water levels.

(4). Actions That Will Be Taken To Minimize Impacts

No further actions will be necessary.

D. Suspended Particulate/Turbidity Determinations.

(1). Expected changes in Suspended Particulates and Turbidity Levels in the Vicinity of the Site.

Due to the already turbid nature of the river, little reduction in light penetration due to increased turbidity is expected. Any effects should be localized and dissipate rapidly, therefore, no significant impacts on primary productivity should occur. The Corps will monitor the suspended sediment plume.

(2). Effects (Degree and Duration) on Chemical and Physical Properties of the Water Column.

(a). Light Penetration - The increased turbidity expected as a result of the proposed action will cause short-term reduction in light penetration. Effects on chemical and physical properties of the water column will be minor to negligible and shortlived.

(b). Dissolved Oxygen - Dissolved oxygen concentrations in the immediate vicinity of the dredging operations may be reduced by oxidation of anoxic sediments. Any reduction in dissolved oxygen that occurs during dredge and disposal activities should be minor, localized, and temporary. Dissolved oxygen levels should at all times exceed the minimum required for aquatic life, which is generally accepted to be approximately 5mg/L for most higher life forms.

(c). Toxic Metals and Organics - Because the source of potential contaminants upstream of the Clearwater River dredging area is limited, no toxic metals are anticipated in the material to be dredged from that area. Sediment samples from the other dredge sites indicated that polynuclear aromatic hydrocarbons and metals were below standards listed for the compounds listed in the Washington Department of Ecology Draft Sediment Standards June 1999. No contaminants are expected to be found in the cobbles at the two navigation lock approach sites.

(d). Pathogens - There are no known anthropogenic sources of pathogenic organisms in the area to be dredged. Although it is possible for some opportunistic pathogens to benefit from the increased nutrients released by the dredging activities, a pulse of pathogenic organisms will be prevented by the near freezing temperatures prevalent during the dredging and disposal operations.

(e). Aesthetics - A noticeable turbidity plume will occur with the operation, but should only extend a short distance downstream.

(f). Other - No other effects.

(3). Effects on Biota.

(a). Primary Production, Photosynthesis - Turbidity generated by the proposed action will be diluted within a short period of time and will have little effect on primary production. Due to the low ambient water temperatures and localized nature of the plumes, no impacts to beneficial primary productivity are expected.

(b). Suspension/Filter Feeders - The temporary increase in suspended particulates will interfere with feeding mechanisms of certain benthic macroinvertebrates. However, the short-term impact will be restricted to the immediate vicinity of the work area. This interference will probably be no greater than that occurring during peak runoff in the late spring. Any impacts are expected to be localized and short-term.

(c). Sight Feeders - In the immediate vicinity of the proposed action, short-term turbidity will be high enough to interfere with predation success of vertebrate sight feeders. The disturbance will be limited to the duration of the project. Although the sight feeders may move out of the disturbed area during the proposed event, it is expected they will return upon completion of the project. These interferences, if they occur, will be of limited duration, and will not coincide with any major migration of anadromous fish. Adequate area exists to allow sight feeders to move out of the turbid zone for feeding purposes.

(d). Actions taken to minimize impacts - No further actions will be necessary.

D. Contaminant Determinations

As in the past small amounts of dioxin and furans contaminants were present at a number of sites downstream of the Snake and Clearwater rivers confluence. These are products originating from pulp bleaching processes. The seven sites that tested positive on the dioxin screen were tested further with high resolution gas chromatograph mass spectrometric methods. Two additional duplicate samples were included. Results showed that there were no concentrations of 2,3,7,8 TCDD, considered a very potent carcinogen, according to Universal Treatment Standards.

These congeners were found at all seven sites: Octachlorodibenzodioxin (OCDD) ranging from 8.81-166.94 parts per trillion, 1,2,3,4,6,7, 8-Heptachlorodibenzodioxin (HpCDD) from 1.05-22.15 parts per trillion, 1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF) at 0.29-2.99 parts per trillion, and octachlorodibenzofuran (OCDF) at 0.57-19.61 parts per trillion. 1,2,3,4,7,8-haxachlorodibenzofuran (HxCDF) found at four sites ranged from 0.12-1.15 parts per trillion. 1,2,3,6,7,8-Hexachlorodibenzodioxin (HxCDD) found at two sites ranged from 0.42- 1.21 parts per trillion.

The proposed disposal method of dredged sediment may help contain chemicals and contaminants. Contaminants would be more associated with silt and the proposed sand capping over the silt could prove beneficial.

E. Aquatic Ecosystem and Organism Determinations.

(1). Plankton Effect - Because the work will be accomplished during the winter, and the turbidity plume will be limited, no effects to phyto- or zooplankton are expected.

(2). Benthos Effects - Benthic communities in the construction area will be disturbed, buried and/or destroyed. Upon completion of the project, adjacent benthic communities should re-colonize the disturbed areas rapidly.

(3). Nekton Effects - Mobile aquatic organisms will likely move out of the immediate area of the proposed dredging and disposal actions, but would return upon completion of the proposed actions.

(4). Aquatic Food Web Effects - Disturbance and destruction of benthic communities at the proposed sites due to disturbances created by the project will cause local reduction in the available food supply to higher organisms resident to the sites. This will displace these resident populations to surrounding water until the food chain is reestablished. The benthic recolonization time period and its impact upon the total food web of the sites should be negligible due to the limited scope of schedule work.

(5). Special Aquatic Sites Effects.

(a). Sanctuaries and Refuges - Not applicable.

(b). Wetlands - Not applicable.

(c). Mud Flats - Not applicable.

(d). Vegetated Shallows - Not applicable.

(e). Riffle and Pool Complexes - Not applicable.

(6). Threatened and Endangered Species

The proposed action is not likely to adversely affect individuals of the listed salmon stocks. The proposed action will be executed during the in-water work window of December 15 through March 1 when few anadromous fish are in the area. To the extent that disposal actions create shallow water habitat, the disposal may benefit threatened fall Chinook salmon.

The proposed action is also not likely to adversely affect bald eagles or bull trout.

(7). Aquatic Life Forms

The effects of the proposed action are expected to be minimal since the zone of turbidity around the project will be minor. Fish will be able to easily avoid the turbid areas.

(8). Land Based Life Forms

No effect.

(9). Actions Taken to Minimize Impacts

None required.

F. Proposed Disposal Site Determinations.

(1). Mixing Zone Determination

See number (2) Compliance with applicable Water Quality Standards and Regulations, below.

(2). Determination of Compliance With Applicable Water Quality Standards and Regulations.

(a). Section 401 certification - Section 401 of the Clean Water Act requires that applicants requesting a Federal license or permit to conduct activities which may result in discharge in the navigable waters of the United States, provide to the licensing or remitting agency, a certification from the State that any such discharge complies with the applicable water quality standards. In this case, the State of Washington certification that the project will not cause a violation of established Washington Water Quality Standards is requested from the Washington Department of Ecology.

The Corps has prepared a monitoring plan for the dredging and disposal activities. The Corps would require the contractor to take water samples and measure turbidity using a nephalometer twice per day during active dredging. The contractor would take samples one hour after dredging begins and one hour before dredging ends each day. Samples would be taken 300 feet upstream from the dredging operation and 300 feet directly downstream from the point of dredging. The contractor would take 2 measurements at each location: 1 meter below the water surface and 1 meter above the river bottom. The contractor would be required to notify the Corps within 8 hours in the event that the turbidity levels measured of the dredging operation exceed allowable levels. These levels are defined as 5 nephalometric turbidity units (NTU's) over background when background is 50 NTU's or less, or more than a 10% increase in turbidity when the background is more than 50 NTU's. Background is measured 300 feet upstream of the dredging operation. The contractor would, immediately upon determining any exceedence of this NTU limit, alter the dredging operation and continue

monitoring turbidity at the downstream location until the NTU levels to returned to an acceptable limit above background. If the NTU levels did not return to an acceptable limit, the contractor would stop dredging and wait for the NTU levels to drop before resuming dredging. If the contractor is unable to alter his dredging operation to meet turbidity requirements, he would contact the Corps for further instructions.

The Corps would also conduct monitoring. During the first two weeks the Corps would set up YSI Sonde®'s (self-contained recording devices) to take readings of turbidity, dissolved oxygen, pH, and conductivity. The YSI Sondes would be stationed 300 feet upstream of the dredging operation, 300 feet downstream of the dredge, 300 feet downstream of the shallow/mid-depth disposal site, and 300 feet downstream of the disposal site at Lost Island HMU. The Corps would download the YSI Sonde information, monitor the downstream plume and analyze the data to ensure water quality standards were being met.

(b). Stream Alteration Permit - A Stream Alteration Permit from the Idaho Department of Water Resources is not required as all work in the state of Idaho would occur within the backwater areas of Lower Granite Reservoir.

(c). Hydraulic Project Approval – The Corps has determined that Federal activities performed on Federal property, including activities performed by a contractor, do not require a Hydraulic Project Approval (HPA) from Washington Department of Fish and Wildlife.

(3). Potential Effects on Human Use Characteristics:

(a). Municipal and Private Water supply - No effect.

(b). Recreational and Commercial Fisheries - The dredging project could have a minor negative effect on steelhead fishing in the confluence area. Dredging in the Greenbelt, Swallows, Willow, Illia, and Hells Canyon Resort Marina boat basins would cause a temporary closure of boating in these areas. Fisherman using boats would have to use a different boat ramp to launch and take out their boats. Fishermen would have to be alert to the extra river traffic created by the dredge and the barges. The turbidity plume may discourage steelhead from moving upriver. However, by the time the dredging takes place, the peak of the steelhead season should have passed. In 1996, the peak of the season was in November - early December (Personal communication, Jim Buck, Clarkston Resources Office, September 12, 1997). For the past three years, the steelhead season has been winding down by the first of January. Therefore, the dredging operation should have a minor impact on recreational steelhead fishing.

(c). Water Related Recreation - Boaters would be unable to use the boat basins during dredging operations in the boat basins.

(d). Aesthetics - The dredging at the confluence, in the boat basins, and at the Hollebeke HMU intake will create a turbidity plume that is expected to extend about 300

feet downstream. This plume would dissipate when dredging ceases for the day or when the dredge is moved to a new location. Dredging in the navigation channel below Lower Granite and Lower Monumental Dams may cause a small plume.

(e). Parks, National Historical Monuments, National Seashores, Wilderness Area, Research Sites, and Similar Preserves - No effect.

(f). Actions to Minimize Impacts - Efforts will be made to notify boaters in advance that the boat basins will be temporarily closed during dredging of the boat launch areas.

(g). Determination of Cumulative Effects on Aquatic Ecosystems - No cumulative effects have been identified or anticipated.

(h). Determinations of Secondary Effects on the Aquatic Ecosystem - No secondary effects have been identified or are anticipated.

Appendix B

Endangered Species Act Biological Assessment For Anadromous Fish

INTERIM DREDGING AND DISPOSAL OF DREDGED MATERIALS LOWER SNAKE AND CLEARWATER RIVERS (2000-2001) WASHINGTON AND IDAHO

BIOLOGICAL ASSESSMENT

1. LOCATION

The Walla Walla District Corps of Engineers (Corps) proposes to dredge sections of the lower Snake and Clearwater Rivers including the Federal navigation channel, port facilities, several recreation sites, and one Habitat Management Unit (HMU) irrigation intake (Plate 18 of the Environmental Assessment). All dredging and disposal would take place within the five reservoirs impounded by Ice Harbor, Lower Monumental, Little Goose, and Lower Granite dams, spanning the region from Tri-Cities, Washington, east to Lewiston, Idaho. The primary area to be dredged extends approximately 1.4 miles from River Mile (RM) 138 on the lower Snake River to the confluence of the Snake and Clearwater Rivers above RM 139, then extends up the Clearwater River approximately 2 miles to just downstream of Memorial Bridge at RM 2 (Plate 19). Disposal areas are along several hundred feet of the submerged south shore on the underwater bench at RM 116, immediately upriver of Knoxway Canyon in Lower Granite reservoir (Plates 18, 30, and 32), and the north shore between RM 22.5 and 23 in Ice Harbor reservoir (Plates 18 and 31).

2. INTRODUCTION

This biological assessment (BA) considers the effects of proposed navigation and maintenance dredging and dredged material disposal to be performed by the Corps at various locations in the lower Snake River and the backwater portion of the lower Clearwater River. This BA addresses dredging and disposal actions that would take place during December 15, 2000, through March 1, 2001. This dredging would be performed as per the Environmental Assessment (EA) for Interim Lower Snake, Clearwater, and Mid-Columbia Rivers Dredging. The Interim EA addresses the impacts of dredging to be performed during the years 2000 through 2003, or until the Corps' Dredged Material Management Plan/ Environmental Impact Statement (DMMP/EIS) is completed and in effect. The dredging to be performed is only that which is necessary until the DMMP/EIS is in place. The purpose of the dredging is to restore the authorized depth of the navigation channel, remove sediment from port areas, provide for recreational use, and provide for wildlife habitat planting irrigation that exists in the Corps managed HMUs. Although the interim EA addresses multiple years of dredging, this BA addresses only the dredging proposed for 2000-2001. The Corps will prepare separate BA's each year when dredging is proposed and will consult with NMFS each year.

Each of the Corps' Snake River reservoirs has required some amount of dredging on a periodic basis over the last 40 years to maintain the navigation channel at the

minimum authorized depth of 14 feet. The Corps also maintains recreation facilities and irrigated wildlife HMUs as part of the lock and dam projects. The boat launch facilities and swimming beaches at the recreation sites periodically require dredging to remove accumulated sediment that reduces water depth and interferes with water quality and safe recreational use. The irrigation intake basins at several wildlife HMUs also require periodic dredging to remove sediment that clogs the pumps. A history of dredging in the Walla Walla District is shown in Table 1.

Table 1
History of Dredging in Lower Snake River and McNary Reservoirs

Dredge Location	Year	Purpose	Amount Dredged (cubic yards)	Disposal
Excavation of Navigation Channel Ice Harbor Lock & Dam Part I & II, Channel Construction	1961	Navigation	3,309,500	Unavailable
Navigation Channel Ice Harbor Lock and Dam Part III, Channel Construction	1962	Navigation	120,000	Unavailable
Downstream Navigation Channel Ice Harbor Lock and Dam	1972	Navigation	80,000	Unavailable
Downstream Approach Navigation Channel Lower Monumental Lock and Dam	1972	Navigation	25,000	Unavailable
Navigation Channel Downstream of Ice Harbor Lock and Dam	1973	Navigation	185,000	Unavailable
Downstream Approach Channel Construction Lower Monumental Lock	1977	Navigation	10,000	Unavailable
Downstream Approach Channel Construction Ice Harbor Lock	1978	Navigation	110,000	Unavailable
Downstream Approach Channel Construction Ice Harbor Lock	1978/ 81/82	Navigation	816,814	Unavailable
Recreation Areas (Corps)	1975 – Present	Recreation	20,000	Upland Sites
Port of Lewiston (Corps)	1982	Navigation/ Maintain Flow Conveyance Capacity	256,175	

Port of Clarkston (Port)	1982	Navigation	5,000	Upland Site
Downstream Approach Channel Construction Ice Harbor Lock	1985	Navigation	98,826	In-Water
Confluence Area (Corps)	1985	Maintain Flow Conveyance Capacity	771,002	Wilma HMU
Port of Lewiston (Corps)	1986	Navigation/ Maintain Flow Conveyance Capacity	378,000	Upland Sites
Confluence Area (Corps)	1988	Maintain Flow Conveyance Capacity	915,970	In-Water
Confluence Area (Corps)	1989	Maintain Flow Conveyance Capacity	993,445	In-Water
Schultz Bar (Corps) Confluence Area (Corps)	1990 1992	Navigation Maintain Flow Conveyance Capacity	27,335 520,695	NA In-Water
Ports of Lewiston, Almota, and Walla Walla	1991/92	Navigation	90,741	Unavailable
Boise Cascade	1992	Navigation	120,742	In-Water
Port of Kennewick	1993	Navigation	6,130	NA
Schultz Bar (Corps)	1995	Navigation	14,100	In-Water
Confluence Area (Corps)	1996/97	Navigation	68,701	In-Water
Confluence Area (Corps)	1997/98	Navigation	215,205	In-Water
Greenbelt Boat Basin Clarkston	1997/98	Navigation	5,601	In-Water
Port of Lewiston (Port)	1997/98	Navigation	3,687	In-Water
Port of Clarkston (Port)	1997/98	Navigation	12,154	In-Water
Lower Granite Navigation Lock Approach	1997/98	Navigation	2,805	In-Water
Lower Monumental Navigation Lock Approach	1998/99	Navigation	5,483	In-Water
Source: USFWS, August 1998/Corps, July 19, 1995, and September 2, 1999.				

The Corps is currently preparing a Dredged Material Management Plan/Environmental Impact Statement (DMMP/EIS) to evaluate the dredged material management requirements for the navigable waterways within its boundaries for the next 20 years. It is Corps policy to dispose of dredged material associated with the maintenance dredging for navigation in a manner that is the least costly, is consistent with sound engineering practice, that meets federal environmental standards, and is beneficial. Examples of beneficial use include inwater disposal to create salmonid habitat, for beach replenishment, and as capping material for landfills.

The Corps had anticipated completing the DMMP/EIS prior to the need to dredge in 2000-2001. However, changes in the preferred alternative have delayed release of the draft DMMP/EIS until late in 2000. This has delayed the Record of Decision until probably sometime in 2001. Because the Corps needs to dredge prior to 2001 to meet its obligations for navigation channel maintenance, recreation, and wildlife management, the Corps has prepared an interim dredging EA to address dredging and dredged material disposal needs until the DMMP/EIS is completed and implemented. The Corps prepared this BA to address impacts of the 2000-2001 dredging.

3. PROJECT DESCRIPTION

To maintain the navigation channel and other facilities, the Corps proposes to dredge and dispose of about 244,269 cubic yards (CY) of material during the established in-water work window of December 15, 2000, through March 1, 2001. The majority of the dredging would take place in the Clarkston, Washington and Lewiston, Idaho confluence of the Snake and Clearwater Rivers (Plate 19). This confluence has a chronic sedimentation problem caused by the two rivers converging in slackwater at the upstream end of Lower Granite reservoir. The confluence channel is periodically dredged to maintain the needed depth of 14 feet for navigation. Surveys conducted in August 1999 indicated that water depth in the navigation channel has been reduced to as little as 10 feet in some locations. Sediment needs to be removed from the channel to restore the authorized depth and provide unrestricted navigational use.

The greatest proportion of the total volume of 244,269 CY is an estimated 183,120 CY of sediment planned to be removed from the federal navigation channel extending from River Mile (RM) 138 on the Snake River to the confluence of the Snake and Clearwater Rivers above RM 139, then extending up the Clearwater River to just downstream of Memorial Bridge at RM 2 (Plate 19). The federal navigation channel extends to within 50 feet of port structures and the Corps is responsible for maintaining this channel.

The Corps plans to remove sediment from several other locations in the confluence area in 2000-2001. Two of these locations are port berthing areas – the Port of Clarkston at RM 139 on the Snake River (Plate 20), and the Port of Lewiston at RM 1 –

RM 1.5 in the lower Clearwater River (Plate 21). The port areas parallel the federal channel and the ports are responsible for maintaining access from the federal channel. About 5,559 CY of sediment would be removed from the Port of Clarkston and about 1,700 CY would be removed from the Port of Lewiston.

Additional areas to be dredged in the confluence area in 2000-2001 include the Hells Canyon Resort Marina entrance at RM 138 (Plate 22), the Greenbelt Boat Basin at RM 139.5 on the Snake River at Clarkston (Plate 23), and the Swallows Park swimming beach and Swallows Park boat basin (RM 141.7 and RM 141.9) on the Snake River at Clarkston (Plate 24). Approximately 3,532 CY of sediment is planned to be dredged from the Hells Canyon Resort Marina entrance, 2,747 CY of sand and silt from the Greenbelt Boat Basin, and 24,852 CY of sand from the Swallows swimming beach and boat basin.

Several other areas outside of the confluence channel are proposed to be dredged in 2000-2001. Two of these areas are for navigation channel maintenance – the downstream approach to Lower Granite Dam navigation lock (RM 107) and the downstream approach to Lower Monumental Dam navigation lock (RM 41.5) (Plates 25 and 26). About 3,139 CY of sediment would be removed from an area about 500 feet long by 200 feet wide downstream of the Lower Granite navigation lock guidewall. About 10,987 CY would be removed from the Lower Monumental navigation lock approach. This area is about 250 feet wide and extends about 2,300 feet downstream from the navigation lock.

There are also two boat launch areas at two Corps recreation sites that are proposed to be dredged in 2000-2001: Illia boat launch at RM 104 (1,439 CY) and Willow boat launch at RM 88 (3,924 CY) (Plates 27 and 28). There is also one irrigation intake basin at Hollebeke HMU (RM 25) that requires sediment removal (Plate 29). The dredging at the intake may also involve dredging an access channel about 1,000 feet long from the Snake River to the intake. Up to 3,270 CY of material would be removed.

Table 2 below lists the sites proposed for dredging in 2000-2001 and the estimated quantities for each.

Site to be Dredged	**Quantity to be Dredged (in cubic yards)**
Federal navigation channel at confluence of Snake and Clearwater Rivers	183,120
Port of Clarkston	5,559
Port of Lewiston	1,700
Hells Canyon Resort Marina	3,532
Greenbelt Boat Basin	2,747

Swallows swim beach/boat basin	24,852
Lower Granite Dam navigation lock approach	3,139
Lower Monumental Dam navigation lock approach	10,987
Illia boat launch	1,439
Willow Landing boat launch	3,924
Hollebeke HMU irrigation intake	3,270
TOTAL	**244,269**

All dredging would be done using mechanical methods. These may include clamshell, dragline, backhoe, or shovel/scoop. Based on previous dredging activities, the method used would likely be clamshell for the mainstem river navigation channel segments. For the boat basins and the irrigation intake dredging, the method would most likely be backhoe. No hydraulic or other methods will be allowed.

All dredging and disposal actions would take place within the established in-water work window of December 15 - March 1 for the mainstem lower Snake River to avoid impacting anadromous fish. Prior to dredging, the Corps will contract with Battelle-Pacific Northwest National Laboratories to conduct salmon redd surveys in areas likely to contain redds to ensure that no redds would be disturbed by dredging or disposal. Based on previous surveys, it is anticipated that redds are most likely to be found only in the dredging areas immediately downstream of the dams in the tailwaters associated with the juvenile fish facility outfalls.

Similar to operations in previous years, such as the 1997/1998 dredging, the substrate material removed from the dredged areas will be disposed in-water to create shallow and mid-depth water habitat targeted for rearing of Snake River fall chinook salmon. Different from disposal options utilized in previous years of confluence dredging, such as 1997/1998, silt will not be deposited in the deep-water site near RM 120 in Lower Granite reservoir. Instead, the silt will be mixed with sand for use as base material for constructing shallow water rearing habitat. The silt/sand base will be capped with a sand layer of at least 80% sand with a minimum thickness of 10 feet (Plate 32 and Figure 3). The sand cap will then be smoothed by dragging a fence, rake, or beam by boat to flatten and level the tops of mounds to form a flat, gently sloping shallow water bar less than 10 feet in depth (Figure 4).

Disposal locations for the dredging to be performed in 2000-2001 were identified based on several criteria. These included the following:

- suitability of existing habitat versus the potential rate of conversion into suitable juvenile fall chinook rearing habitat;
- the location of the site in relation to existing suitable and utilized fall chinook rearing habitat;

- the contour shape conducive for barge access for rapid release of material and capacity to be filled resulting in achieving the final habitat attribute design in the most expedient time frame;
- location in relation to dredging locations.

In general, material would be scooped from the river bottom and loaded onto a bottom-dump barge. The contractor would be allowed to overspill excess water from the barge while the barge is being loaded. The water would be discharged a minimum of 2 feet below the river surface. The Corps estimates it could take about 6-8 hours to fill a barge. The barge would then be pushed by a tug to the disposal site. No material or water would be discharged from the barge while it is in transit. Once the barge arrived at the appropriate disposal site, the bottom would be opened to dump the material all at once (Figure 2). The barge would then be returned to the dredging site for additional loads. The contractor could be expected to work between 10 and 24 hours per day 6-7 days per week.

Disposal of all dredged material would be in-water in one of two depth zones: (1) shallow water, 0 – to 20 feet below the surface, or (2) mid-depth, 20 to 60 feet below the surface. For all of the dredging except for the Lower Monumental Dam navigation lock approach, the disposal location would be at RM 116 in Lower Granite reservoir (Plate 30). This site is a shallow bench on the left bank of the Snake River just upstream of Knoxway Canyon. The Corps selected this site because it is close to the confluence (where most of the dredging would occur), could provide suitable resting/rearing habitat for juvenile salmon once the river bottom is raised, would not interfere with navigation, would not impact cultural resources, and is of sufficient size to accommodate dredged material disposal for several years. The sequence of dredged material disposal at RM 116 is designed to accomplish two goals: 1) create shallow water habitat for juvenile salmon, and 2) dispose of silt in a beneficial manner.

Information on the types of sediments proposed for excavation in 2000-2001 and the contaminant levels in those sediments has been determined. The Corps took sediment samples from the dredging areas in June 2000 for grain size analysis and contaminant level determination. The results of this analysis are available upon request. The sediments to be removed range from predominantly sand out in the main channel to smaller particle sizes with some fine sand, silt and clay near the shorelines. The sediment samples from the main navigation channel in the confluence area contain between 85 - 90% sand with 10-15% silt and fines. Sand is defined to be 0.2 mm in diameter or larger. Sediments at the Lewiston and Clarkston Ports were comprised of more than 90% silt. The boat basins at Willow, Hells Canyon Resort Marina and Swallows and the intake at Hollebeke HMU averaged 56-67% sand and 21-27 % fines. Green Belt boat basin averaged 35% fines and 45% sand. Downstream lock approach sites below Lower Granite and Lower Monumental Dams contained large rock substrate and 1 to 6 inch cobbles.

There is some question of embankment stability because of the amount of silt to be incorporated in the embankment. The Corps is concerned that the silt may slump or compress, causing a loss in elevation of the finished embankment. The contractor will be required to monitor and record the amount of sand and silt placed in the embankment. The Corps will then determine the percent silt in the base and monitor any movement of the base. Monitoring would be accomplished by taking cross-section soundings after disposal is complete and again in the summer after high flows to determine if the embankment slumps or moves. The Corps would use this information to make adjustments in the percentage of silt allowable for future dredged material disposal and to determine whether or not a berm needs to be constructed around the toe of the embankment to prevent movement.

The material removed from the Lower Monumental navigation lock approach would be disposed of at Lost Island HMU, which is located in the Ice Harbor reservoir on the right bank of the Snake River at RM 22-23 (Plate 31). The site is on the downstream end of a river bar and was used as the disposal site for the 1998-1999 dredging of the same navigation lock approach. Water depth at the site is about 35 feet deep. A small mound of cobbles from the previous disposal in 1998/1999 is located near the shoreline. The contractor would nudge the barge as close to the river bank as possible at the upstream edge of the disposal area before dumping the material on top of the existing mound. The contractor would continue to dispose of dredged material on top of the mound until the water was 15-20 feet deep. He would then dump material on the downstream slope of the mound to create an embankment parallel to the shoreline. These materials will later be used for habitat enhancement or shoreline protection of new habitat slopes from wave erosion instead of riprap. The intent of the disposal would be to create a shallow-water bench parallel to the shoreline.

The classification of the dredged material as silt, sand, or gravel/cobbles, and the designation of shallow, mid-depth, and deep in-water disposal areas is based on a multi-year study conducted by the Corps and Dr. David Bennett of the University of Idaho. In the late 1980's and early 1990's, the Corps did several test disposals of dredged materials in Lower Granite reservoir. Dr. Bennett and his students then conducted several studies through the mid-1990's to determine the effects of the dredged material disposal on the aquatic environment, especially on salmonid stocks and sturgeon. Dr. Bennett was able to use the results of these studies to make recommendations on how to dispose of dredged material in a way that could benefit salmon or at least not harm salmon. His studies indicated that disposing of sand and cobbles in mid-depth or shallow-water sites can be beneficial because it creates important fish habitat, especially for juvenile fall chinook salmon. His studies also indicated that silt as a substrate has no benefit for salmon, and that disposing of the silt in deep-water sites would have no impact, either positive or negative, on species of salmonids. Disposal of silt in deep water could provide some benefit to resident white sturgeon through supplementation of aquatic food sources, such as chironomids and

oligochaetes, from the more productive confluence into the deeper zone occupied by white sturgeon.

This alternative was removed from further consideration because it isn't the alternative that most adequately meets the requirements of Section 404 of the Clean Water Act. The Clean Water Act prohibits filling of waters of the U.S. when a practicable alternative exists. The Region 10 office of the Environmental Protection Agency (EPA) has stated because the Corps could dispose of the material in an upland disposal site, the Corps would need to select the upland disposal alternative to meet the requirements of the Clean Water Act. However, EPA has stated that in-water disposal of dredged material would be acceptable if the material was used in a beneficial way, such as the creation of a base for shallow water fish habitat (alternative d below). Because the No Change alternative includes disposal of silt in the deep water disposal sites, which has no environmental benefit, this alternative was removed from further consideration.

The type of material to be dredged depends on the location of the dredging. The sequence of dredging in each location depends on the sequence of disposal as the material is either silt/sand used as base fill or sand used as cap material. The Snake/Clearwater Rivers confluence area is typically composed of a mix of coarse sand, fine sand, silt, fine silt, and organic material (wood particles). This determination is based on samples taken during previous dredging operations and from sediment samples taken in June 2000 from the areas to be dredged in 2000-2001. The samples were collected and analyzed to identify which sites or portions of sites contain mostly silt and which ones contain mostly sand or coarser material. Sand is the dominant substrate composition in the main navigation channel with silt/fines located more near the shore, in the port areas, and in the Greenbelt Boat Basin. Silt is the dominant substrate composition in the other boat basins and the irrigation intake. In the area below the Lower Granite and the Lower Monumental navigation locks, river cobbles 2-6 inches in diameter with little fines and possibly some large rock up to 18 inches in diameter dominate the substrate composition. Sand is dominant in the Swallows Beach swim area.

4. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES.

a. <u>Water Quality</u>

The lower Snake River is categorized by the State of Washington as Class "A" excellent waters. For the most of the year, parameters measured to obtain this rating are within the codified State water quality standards with the exceptions of total dissolved gas, temperature, and dissolved oxygen (only when there is heavy sediment loading). The Snake River can at times have an extremely high sediment load. During naturally occurring runoff periods some additional water quality parameters (especially

turbidity) are not to standard The river carries a large sediment load due in part to soil erosion from agricultural practices and other land management upriver. Because the Snake flows through an area of agricultural use with a few industries, the sediments tend to be highly enriched with nitrate and other nutrients. The sediments have small amounts of herbicides and pesticides, low levels of dioxin, and few heavy metals. The water does not have a significant oxygen deficit.

Water quality in the Clearwater River is better than the Snake. There are fewer sources of sediment in the basin, which results in water with a sediment load much less than the Snake River. There are also few sources of contaminants. Discharge of effluent from wastewater treatment plants, and port and industrial facilities may affect water quality.

Based on surveys and evaluations in the last 12 years, the surface materials of interest for this project were deposited in the Clarkston and Lewiston areas by both the Snake and Clearwater Rivers. Sediment samples taken for previous dredging operations and in June 2000 have contained between 85 and 90% sand with 10-15% silt and fines.

The sediments to be removed in 2000/2001 range from predominantly sand in the main channel to smaller particle sizes with some fine sand, silt and clay near the shorelines. The Corps contracted with Vizcaya Chemical Labs, an EPA certified laboratory, to determine content and particle size of 53 samples taken from June 2 – June 9, 2000 at and in the near vicinity of the proposed dredging sites. The contract specified dry weight testing only. Grain size charts and scales assign gravel as being particle sizes 4.75 mm and larger, sand from .075 to 4.75 mm, and fines as less than .075 mm. Of the 53 samples, average particle sizes were 5 percent gravel, 18 percent fines, and 77 percent sand. Fines are more prevalent in the lower Snake River boat basins and are associated with shallower water depths and less water movement. Material to be dredged from the port areas, recreation sites, and HMU irrigation intake is up to 50% silt and fines.

Downriver lock approaches at Lower Granite and Lower Monumental Reservoirs sediment samples are comprised of large rock substrate, and 1- to 6-inch cobbles. Based on the particle size, low surface area and substrate composition the Corps made the determination that little or no contamination (induced by contaminated water to cobble contact) would be expected therein.

In addition to sampling particle size the Corps contracted with Vizcaya Chemical Labs for a series of analyses on samples collected in 2000 to determine chemical content of sediments at potential dredging sites in the lower Snake River and the confluence of the Snake and Clearwater rivers. Chemical tests included polynuclear aromatic hydrocarbons, organophosphate pesticides, chlorinated herbicides, oil and

grease, glyphosate, ampa, dioxin and metal analysis. Results from herbicide and pesticide tests were below reportable laboratory detection testing levels. Polynuclear aromatic hydrocarbons (PAH) and metal concentrations were below standards listed for the compounds listed in the Washington Department of Ecology Draft Sediment Standards dated June 1999. For the glyphosphate tests only one site located in the Green Belt Boat Basin at Clarkston showed glyphosate above lab detection limits at 23 parts per billion. Two other samples for glyphosate in the same boat basin came back below reportable lab detection limits. This compound is highly soluble and should biodegrade.

Twenty-four sites were sampled and screened for dioxin from the confluence of the Snake and Clearwater rivers downriver for several miles in Lower Granite reservoir. Chlorinated furans and dioxin congeners have been detected in the past in these areas (1991, 1996, and 1998). This year's results showed 7 sites to contain some chlorine dioxin congeners. One site is at the confluence, three sites are on the left bank travelling downriver (RM 139.1 and RM 138.4) and in the Hells Canyon Resort Marina which is also located on the left bank traveling downriver. High resolution gas chromatograph-mass spectrometric tests were performed as additional tests on these sites. The results showed that the dioxins were less toxic forms and in minute quantities (parts per trillion).

Thirty-eight locations were sampled for oil and grease. Results varied from 41-770 parts per million. Only three of the samples exceeded 400 ppm downriver from boat basins. These sites all yielded concentrations of PAH chemicals below reportable lab detection limits, oil and grease composition was probably from animal matter. Total organic carbon (TOC) concentrations were also low in these areas. Based on these results the sediments should pose no problems for unconfined disposal.

Naturally occurring chemical substances that may increase basic loading to the water column will occur as a result of re-suspension of sediments at the dredging and off-loading disposal areas. The increased chemical load will become diluted in the mixing zone, and should not have a significant impact on the aquatic environment. Small increases in the pH and alkalinity are expected for short periods. No permanent change is expected.

The proposed dredging project is expected to have a temporary negative effect on water quality in both the Snake and Clearwater rivers, mostly because of turbidity plumes caused by the dredging and disposal. The dredging at the confluence area is expected to have some negative effect because the sediments are expected to contain some proportion of silt. This plume would dissipate when dredging ceases for the day or when the dredge is moved to a new location.

Turbidity increase would occur in the immediate vicinity of the proposed dredging and the disposal areas in Lower Granite reservoir. Sediments, re-suspended during dredging of the navigational areas, will cause a plume of turbid water downriver of the activity. Based on previous dredging activities in the confluence area, the zone of turbidity is not expected to constitute more than 15 percent of the river width nor extend downriver more than 300 meters (984 feet). Any decrease in clarity would be short-term and will quickly dissipate. Due to the already turbid nature of the river, little reduction in light penetration due to increased turbidity is expected. Any effects should be localized and dissipate rapidly, therefore, no significant impacts on primary productivity should occur. The Corps Contractor and the Corps will monitor the suspended sediment plume for regulation of activities according to the Corps Monitoring Plan described below.

The dredging of the Lower Granite and Lower Monumental downstream navigation lock approaches may cause some short-term turbidity. However, because the substrate to be removed is cobble and gravel with few fines, the dredging would create little turbidity.

The dumping of the dredged material at the disposal sites (Figure 2) is also expected to cause a turbidity plume. The plumes are expected to be of short duration as the dumping of a barge is a singular event as opposed to the continuous operation of the dredge. Previous disposal actions have shown that the material tends stay in a clump as it drops from the barge to the riverbed, further minimizing the size of the plume.

The resuspension of sediments may cause a slight reduction in dissolved oxygen levels. Dissolved oxygen concentrations in the immediate vicinity of the dredging operations may be reduced by oxidation of anoxic sediments. Any reduction in dissolved oxygen that occurs during dredge and disposal activities should be minor, localized, and temporary. Dissolved oxygen levels should at all times exceed the minimum required for aquatic life, which is generally accepted to be approximately 5mg/L for most higher life forms.

Post-project water velocities are not expected to be markedly different from pre-project flows. However, slight changes will result from somewhat shallower water depths in the immediate vicinities of the disposal areas.

Dredging the navigation channel downstream of Lower Granite and Lower Monumental Dams should have little effect on water quality as the material to be removed is expected to be river cobble 2-6 inches in diameter with few fines and possibly some larger rock up to 18 inches in diameter. Disposal of this material is also expected to have little impact, but may cause a small turbidity plume. No contaminants are anticipated.

Although the proposed 2000-2001 dredging project is expected to have a temporary negative effect on water quality in both the Snake and Clearwater rivers, mostly because of turbidity plumes caused by the dredging and disposal, the dredging at the ports, in the boat basins, and at Hollebeke HMU are expected to have the most impact because the sediments in these areas are expected to contain a higher proportion of fine sediments. The Corps anticipates that dredging operations in these locations will create a detectable plume extending up to 1,000 feet downriver. However, operations causing a 5 nephalometric turbidity unit (NTU) increase over background (10% increase when background is over 50 NTU's) at a point 300 feet downstream will not be allowed. This plume would dissipate when dredging ceases for the day or when the dredge is moved to a new location.

The Corps has prepared a monitoring plan for the 2000-2001 dredging and disposal activities. The Corps would require the contractor to take water samples and measure turbidity using a naphalometer twice per day during active dredging. The contractor would take samples one hour after dredging begins and one hour before dredging ends each day. Samples would be taken 300 feet upstream from the dredging operation and 300 feet directly downstream from the point of dredging. The contractor would take 2 measurements at each location: 1 meter below the water surface and 1 meter above the river bottom. The contractor would be required to notify the Corps within 8 hours in the event that the turbidity levels measured of the dredging operation exceed allowable levels. These levels are defined as 5 NTU's over background when background is 50 NTU's or less, or more than a 10% increase in turbidity when the background is more than 50 NTU's. Background is measured 300 feet upstream of the dredging operation. The contractor would, immediately upon determining any exceedence of this NTU limit, alter the dredging operation and continue monitoring turbidity at the downstream location until the NTU levels to returned to an acceptable limit above background. If the NTU levels did not return to an acceptable limit, the contractor would stop dredging and wait for the NTU levels to drop before resuming dredging. If the contractor is unable to alter his dredging operation to meet turbidity requirements, he would contact the Corps for further instructions.

The Corps would also conduct monitoring. The Corps would set up YSI Sondes® water quality instruments (self-contained recording devices) to take hourly readings of turbidity, dissolved oxygen, pH, and conductivity. The YSI Sondes would be stationed 300 feet upstream of the dredging operation, 300 feet downstream of the dredge, upstream of the in-water disposal areas, 300 feet downstream of the two shallow/mid-depth disposal sites (one YSI Sonde at each site), and 300 feet downstream of the deep water site. The Corps would download the YSI Sonde information daily and analyze the data to ensure water quality standards were being met.

b. Aquatic Environment

Turbidity generated by the proposed action will be diluted within a relatively short period of space and time and should have little effect on primary production. Due to the low ambient water temperatures and localized nature of the plumes, no impacts to beneficial primary productivity are expected. Because the work will be accomplished during the winter, and the turbidity plume will be regulated, no detectable effects to phyto- or zooplankton are expected. Mobile aquatic organisms will likely move out of the immediate area of the proposed dredging and disposal actions, but would return upon completion of the proposed actions.

Studies in Lower Granite, Little Goose, and Lower Monumental reservoirs (Bennett and Shrier 1987; Bennett et al. 1988, 1990, 1991, 1993a, 1993b, 1995a, 1997a; Bennett and Nightengale 1997) indicate low diversity in the benthic macroinvertebrate communities that occupy soft substrates (silts, sands, and small gravels), being primarily composed of oligochaete worms and dipteran chironomid fly larvae. Diversity is higher in macroinvertebrate communities that occupy shoreline oriented hard substrate (large gravels, cobble, and boulder, including rip-rap) where tricopteran caddisflies and ephemeropteran mayflies are present with molluscs, primarily Corbicula clams. Many tricopterans are seasonally replenished into the upper reaches of Lower Granite reservoir through drift out of the Clearwater River. Crayfish are relatively abundant with a more cosmopolitan distribution between the rip-rap and across the channel. The benthic communities are expected to be stable and not subject to severe annual disruption.

Benthic invertebrates inhabiting the dredge removal areas will be displaced and/or overlain by sediment during dredging, and a low percentage will be destroyed while most will be transported to colonize the disposal site. Dredged material disposal monitoring in Lower Granite Reservoir, under similar sediment conditions, showed that benthic invertebrates rapidly recolonized areas where dredged material was deposited. Benthic macroinvertebrate recolonization at the community level should occur within six months to one year through connectivity to adjacent and similar benthic communities and from drifting organisms from upriver sources. However, annual disturbances (associated with natural and/or dredging events) will continue to affect recolonization efforts. Any benthic organisms inhabiting the disposal area would be buried by the dredged material. Recolonization should occur rapidly by organisms imported with the dredged material.

The temporary increase in suspended particulates will interfere with feeding mechanisms of certain benthic macroinvertebrates. However, the short-term impact will be restricted to the immediate vicinity of the work area. This interference will probably be no greater than that occurring during peak runoff in the late spring. Any impacts are expected to be localized and short-term.

With respect to aquatic food web connectivity and function, disturbance and destruction of benthic communities at the proposed removal and disposal sites may cause local reduction in the available short-term, but seasonal food supply to higher organisms resident to the sites. This will displace these resident populations to surrounding water until the food chain is reestablished. The benthic recolonization time period and its impact upon the sites total food web should be negligible.

The lower Snake River reservoirs support several species of resident fish including smallmouth bass, largemouth bass, crappie, bluegill, yellow perch, channel catfish, brown bullhead, redside shiners, squawfish, suckers, white sturgeon, peamouth, chiselmouth, and carp. Spawning of most species occurs from early April through August. Resident fish spawning has not been recorded during the winter in-water work period.

In the immediate vicinity of the proposed action, short-term turbidity will be high enough to interfere with predation success of vertebrate sight feeders. The disturbance will be limited to the duration of the project. Although the sight feeders may move out of the disturbed area during the proposed event, it is expected they will return upon completion of the project. These interferences, if they occur, will be of limited duration, and will not coincide with any major migration of anadromous fish. Adequate area exists to allow sight feeders to move out of the turbid zone for feeding purposes.

During dredging, impacts on aquatic resources should be minimal. In-water work would occur between December 15 - March 1 to minimize conflicts with returning adult steelhead and chinook salmon and outmigrating smolts. No resident fish should be spawning during this time period. White sturgeon should not be affected as they prefer deeper water with higher velocities upriver of the confluence of the Snake and Clearwater rivers (Lepla 1994). Benthic invertebrates inhabiting the project area would be displaced and/or overlain by sediment during the dredging and disposal. Monitoring of previous dredged material disposal in Lower Granite Reservoir, under similar sediment conditions, showed that benthic invertebrates rapidly recolonized areas where dredge material was deposited (Bennett et al. 1990, 1993a, 1993b).

5. LISTED SPECIES AND EFFECTS

A. Endangered Species

Snake River Sockeye Salmon (*Oncorhynchus nerka*)

The proposed actions should have no effect on the Snake River sockeye salmon stock, because no individuals of this stock should be present in the Snake or Clearwater rivers during the winter in-water work window of December 15, 2000 through March 1, 2001. Wild adult sockeye salmon pass through the project area between late June and

August. Juvenile sockeye generally migrate downstream during April and May. The first adult sockeye salmon are not counted at Bonneville Dam until mid-May (Corps Annual Fish Passage Reports 1991-1999).

There should be no effect on individuals of the sockeye salmon stock through alterations of critical habitat caused by dredging, because this stock uses the proposed dredging areas only as migration corridors. Designated Critical Habitat and Essential Fish Habitat (EFH) for potential rearing or over-wintering for Snake River sockeye salmon are not present in the lower Snake River or the proposed project area. The components of designated Critical Habitat and EFH for juvenile and adult migration passage are present between mid-March and mid-June. No spawning habitat for sockeye salmon is present in the proposed project area. This evolutionary significant unit (ESU) is comprised of a stock with an upriver spawning lifestyle that uses accessible lakes in the Salmon River subbasin for spawning and rearing, therefore no individuals should utilize the dredging activity areas of the Snake or Clearwater rivers during the winter of the designated in-water work period for rearing, feeding, or over-wintering.

In the event that sockeye salmon production should increase under the National Marine Fisheries Service (NMFS) 1995 Biological Opinion, the passage dates for adult sockeye salmon would be similar based upon historical trend data. In addition, there should be no effect on individuals of these stocks through alterations of critical habitat caused by dredging, because these stocks use the proposed dredging areas only as migration corridors.

B. Threatened Species

Snake River Fall-run Chinook Salmon (*Oncorhynchus tshawytscha*)
Snake River Spring/Summer-run Chinook Salmon (*Oncorhynchus tshawytscha*)
Snake River Basin Steelhead (*Oncorhynchus mykiss*)

The Snake River supports spring/summer and fall chinook salmon, which were both listed as threatened in April, 1992; and steelhead, which was listed as threatened on October 17, 1997. The wild adult chinook salmon runs consist of overlapping migrations of spring, summer, and fall races in the project area during April through December, with wild spring chinook occurring April through mid-June, wild summer chinook occurring mid-June through mid-August, and wild fall chinook occurring mid-August to spawning in the river above Lower Granite reservoir by mid-December. Adult wild Snake River fall chinook salmon migrate through the Snake River from late summer to early winter with spawning activity not beginning until mid-October (Connor et al. 1994). The wild juvenile chinook salmon runs consist of overlapping migrations of spring, summer, and fall races in the project area during March through October, with some remnant proportion of the fall chinook outmigration population lingering into

December. Wild juvenile spring chinook typically pass March through mid-June, wild summer chinook typically pass May through July, and wild fall chinook typically pass mid-June through September, with double peaks in mid-July, and some lingering proportion of the annual migration population lasting until December.

Juvenile Snake River fall chinook salmon use shallow, open water, sand substrate in backwater-type and opposing bar habitat areas for rearing periods during their outmigration. These fish tend to outmigrate as subyearlings during their year of emergence over a period of weeks or months, feeding and growing as they progress downriver (Bennett et al. 1997a). Many of the juvenile fall chinook salmon outmigrating from the Clearwater and Snake rivers spend time in shoreline areas (<3 meters in depth) in Lower Granite and downriver reservoirs, where they prefer sand-substrate areas (Curet 1994, Bennett et al. 1997a). When water temperatures reach about 18 degrees Centigrade, these fish appear to have achieved adequate growth and fitness due to the warming up conditions of these shallow water habitat areas and leave the shoreline areas to either continue rearing and/or begin their migration in the cooler pelagic zone of the reservoirs (Bennett et al. 1997a).

Placement of the dredged material in the shallow/mid-depth site at Knoxway Canyon is expected to be beneficial to salmon. Criteria for beneficial use of dredge material based upon the size of material placed and the depth of placement was developed based upon the research and monitoring recommendations of Dr. David Bennett, a researcher at University of Idaho, who supervises the on-going study of the effects of in-water disposal in Lower Granite reservoir. Dr. Bennett's team has found that sediments consisting of at least 80% sand 0.21 mm in diameter or larger is the preferred substrate for juvenile salmon. A depth of 20 feet to define the boundary between mid-elevation depth and shallower water was determined based upon typical limits of the photic zone conducive for primary and secondary productivity of food web constituents, as well as preferred depths of open sandy bench habitat important for juvenile fall chinook rearing (Bennett et al. 1993a, 1993b, 1995a, 1997a; Curet 1994; Connor et al. 1994; Rondorf and Miller 1994).

The project area of the Snake River is designated to be critical habitat for all three Snake River salmon ESU stocks (December 28, 1993; 58 FR 68543) and for Snake River Basin steelhead (February 16, 2000; 65 FR 7764). In designating critical habitat, NMFS considers the following requirements of the species: (1) space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, or rearing of offspring; and, generally, (5) habitats that are protected from disturbance or are representative of historical geographical and ecological distributions of the species.

In addition to these factors, NMFS also focuses on the known physical and biological features (primary constituent elements) within the designated area that are essential to the conservation of the species and that may require special management considerations or protection, termed Essential Fish Habitat (EFH) pursuant to the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. 1801 *et seq*. These essential features may include, but are not limited to, spawning sites, food resources, water quality and quantity, and riparian vegetation (50 CFR 424.12(b)), and can be generally described to include the following: (1) juvenile rearing areas; (2) juvenile migration corridors; (3) areas for growth and development to adulthood; (4) adult migration corridors; and (5) spawning areas. Within these areas, essential features of critical habitat include adequate: (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) safe passage conditions. Adjacent riparian area is defined by NMFS as the area adjacent to a stream (river) that provides the following functions (components of Properly Functioning Habitat (PFH) or Properly Functioning Condition (PFC)): shade, sediment transport, nutrient or chemical regulation, streambank stability, and input of large woody debris or organic matter.

Section 9 of the ESA makes it illegal to "take" a threatened or endangered species of fish. The definition of "take" is to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 U.S.C. 1532(19)). NMFS interprets the term "harm" in the context of habitat destruction through modification or degradation as an act that actually kills or injures fish.

Very few of the EFH components that existed along the shoreline of the lower Snake River reservoirs have been modified or eliminated in the recent past due to previous maintenance dredging, where other associated human activities and economic growth along the shorelines have resulted in some modification of habitat that introduced additional needs for dredging. The two EFH components that may have been potentially influenced by confluence dredging in the past are (2) juvenile migration corridor and (4) adult migration corridor, specifically the essential features of (1) substrate, (2) water quality, (7) food, as in macroinvertebrate production, and (10) safe passage conditions. Adjacent to the footprint boundary for dredging in the confluence is a critically important (1) juvenile rearing area for fall chinook salmon in the embayment of Wilma. The existing open, sandy, shallow water rearing habitat within Wilma remains protected from modification of any bathymetric feature that would be due to proposed dredging, therefore not affected by the dredging proposed to occur in the mainstem channel. Dredging activities will be confined to the in-water work window when no or very few salmonids would be migrating or requiring premigration rearing, so exposure to short-term increases in turbidity should not exist. Dredging is not allowed at elevations below the existing channel bottom contours because removal of input sand and silt is the target, hence native substrate classes of cobble and gravel suitable for spawning should not be affected. It has been routinely shown that macroinvertebrates displaced

by dredged material removal aid in colonizing or supplementing existing populations at the in-water disposal sites and that the populations at the removal site become recolonized relatively rapid depending upon season (Bennett et al. 1990, 1991, 1993a, 1993b, 1995a, 1995b; Bennett and Nightengale 1996), both influenced through the mechanism of drift.

The EFH components that may be potentially influenced by dredging in the boat basins or their approaches from the main channel are (1) juvenile rearing areas, (2) juvenile migration corridors, and (4) adult migration corridors; specifically the essential features of (1) substrate, (2) water quality, (5) water velocity, (7) food, as in macroinvertebrate production, and (10) safe passage conditions. Boat basins and HMU water intake basins fill with fine substrate dominated by silt that is not suitable substrate preferred by salmonids. High use by recreational boat traffic can limit their suitability for salmonid rearing. Dredging activities will be confined to the in-water work window when no or very few salmonids would be migrating or requiring premigration rearing, so exposure to short-term increases in turbidity should not exist and removal of unsuitable size classes of substrate should not have a negative effect. These areas will be dredged by mechanical means to virtually eliminate the possibility of entrainment of any juvenile salmonid that may be present. Water velocities will not be affected since these areas are functionally shallow water back eddies more suitable for resident fish. Macroinvertebrates displaced by dredged material removal can aid in colonizing or supplementing existing populations at the in-water disposal sites and that the populations at the removal site become recolonized relatively rapid depending upon season. An additional concern with the substrate quality removed from boat basins that have not been dredged in a number of years, such as the Hells Canyon Resort Marina, is the potential for the accumulation of bound contaminants in the silt as a result of spillage from fueling or other activities, or brought downriver to settle in the lower velocities of the backwater eddy environment. Recent sampling in these basins indicate that concentrations of contaminant indicators are below the level that would preclude their disposal in-water. In the event that a pocket of visually contaminated sediments is hauled up in the clamshell or bucket, the Corps would direct that such an area would be classified and investigated as Hazardous Waste and deposited in a truck for removal to an appropriated established waste disposal site.

The EFH component that may be potentially influenced by dredging in the lock approaches of Lower Granite and Lower Monumental dams are (5) spawning areas, specifically the essential features of (1) substrate, (5) water velocity, (6) cover/shelter, and possibly (7) food, as in macroinvertebrate production. Prior to dredging, these areas will be surveyed for redds according to established protocol (Dauble et al. 1995) to determine if modifications to velocity and substrate could cause salmon to avoid these areas for spawning. If redds are found and verified, then location and duration of dredging will be modified to accommodate avoidance and protection of any verified redds.

The Corps believes that additional maintenance dredging contained entirely within the previously disturbed footprint would not degrade the suitability of that habitat for Snake River spring/summer and/or fall chinook salmon, and/or Snake River Basin steelhead, thus not adversely modifying Critical Habitat or EFH components of that Critical Habitat. This is because the area is used primarily as a migration corridor for all lifestages of these stocks and migration of each lifestage of each stock has terminated for the brood years, with the exception of potential for utilization of the submerged shallow water for rearing and feeding by fall chinook and some adult migration by B-run steelhead to upriver tributaries to hold for spawning in the following spring. None of the known or potential areas used by fall chinook for rearing will be disturbed by any dredging action.

No adult individuals of Snake River fall chinook salmon stock should be present at the confluence of the Snake and Clearwater rivers in late-December 2000, or January and February 2001. These fish migrate to the Snake and Clearwater rivers from late summer to early winter, and all spawning activity should be completed by mid-December (Connor et al. 1994). Habitat from Snake RMs 148.3 to 246.5 are annually surveyed for fall chinook salmon redds through December by the US Fish and Wildlife Service FRO in Ahsaka, ID (A. Garcia memo, 1999). Garcia et al. (1986-1999) found no evidence of fall chinook salmon spawning in or near Snake River miles below RM 144. The nearest redd location was a single redd in 1990 at Snake RM 148.3 (Ten Mile Range No. 1).

No spawning habitat is present in the proposed dredging areas, except the possibility of limited fall chinook spawning in the adjacent tailrace areas of Lower Granite and Lower Monumental dams (Dauble et al. 1998, Kenney 1992). Although juvenile Snake River fall chinook salmon are spawned and rear in the Snake and Clearwater rivers above the proposed dredging sites (Connor et al. 1994), the low velocity and relatively fine substrate input to the upper reaches of Lower Granite reservoir preclude spawning in the confluence area. Spawning of fall chinook salmon has been known to occur in Little Goose, Lower Monumental, and Ice Harbor reservoirs, but only in tailwater areas of the dams near the water discharging influence of bypass outfalls, where water velocity is high and substrate size is relatively large (Dauble et al. 1995, 1996).

Dredging proposed to occur within the tailwater downriver of the navigation lock guidewall of Lower Granite and Lower Monumental dams could contain less than 10 to 12 redds, where predominately cobbles likely rolled in since the 1996-97 and 1998-99 dredging activities due to high spring flows would be removed. Cobbles are preferred spawning substrate for mainstem spawning Snake River fall chinook. These areas are located within the 14 foot designated navigation channel and were dredged during either the 1996-97 or the 1998-99 in-water work windows. A few redds have previously been located based upon a GIS-directed field monitoring evaluation on spawning parameter data and redd surveys conducted between 1994 and 1998 that resulted in

velocities and depths profiles that delineated suitable spawning habitat components within the preferred ranges for fall chinook salmon redd construction. No redds have been located in the areas downriver of the navigation lock approaches at Lower Granite or Lower Monumental dams since 1994 (Dauble et al. 1995, 1996, 1999).

Wild Snake River fall chinook salmon typically outmigrate as subyearlings in the spring and summer of their emergence year. Based on the typical Snake River fall chinook salmon outmigration pattern, few or no juvenile chinook salmon should be present in the confluence of the Snake and Clearwater rivers or the previously dredged tailwater area immediately below the Lower Granite or Lower Monumental navigation lock guide walls during the dredging period of December 15, 2000 through March 1, 2001.

On the other hand, PIT-tag detections of 1993-95 brood year fall chinook salmon from the Clearwater River were recorded in the spring of 1994-96 at some lower Snake River dams (Personal Communication between Bill Arnsberg, Nez Perce Fisheries, and Dan Kenney, Walla Walla District Corps of Engineers, June 18, 1996). It is unknown whether these fish overwintered in the free-flowing Clearwater River or in one or more of the lower Snake River reservoirs. More PIT-tagged chinook outmigrants were detected in the spring of 1994 and 1995 than in the previous summer/fall, while the trend was reversed with the 1995 brood year. It is apparent from these detections that some Clearwater River fall chinook salmon migrate to the ocean as yearlings, rather than as subyearlings, possibly due to stunted growth rates in the late summer and early fall from cold water releases from Dworshak dam aimed at augmenting flows for adult immigration. The Corps is unaware of information on the extent of overwintering of juvenile fall chinook in the Clearwater River, but has no reason to believe that overwintering in the area of the proposed dredging is a common occurrence or behavior. If any juvenile fall chinook salmon are in the confluence area during the proposed activities, the Corps believes that they would be sufficiently agile and aware to avoid the dredging equipment. Also, suspended sediment concentrations downriver of the dredging should be well below the level that would cause mortality (Bennett and Shrier 1986, Newcomb and Jensen 1997).

Although the majority of the substrate to be removed by dredging within the confluence and each boat basin and HMU and their approaches is sand (the preferred shoreline substrate for rearing subyearling chinook salmon) the highest proportion of substrate remaining on the river bottom would remain sand because the depth of the incoming sediment exceeds the limits of the dredging depth. An exception could be the dredging that would occur along the engineered levee areas near and adjacent to the Ports of Lewiston and Clarkston, where sediment could be removed to the rip-rap surface of the levee all along the distance to the shoreline as been previously done in 1997/1998. Although we know of no standard definition of shoreline or shallow-water habitat other than depth and slope characteristics, we do not believe that the dredging

would decrease the amount of this habitat available to juvenile fall chinook salmon. This is because all dredging would be no more than 15 feet below the minimum operating pool elevation of Lower Granite reservoir (elevation 733 feet), and most of the dredging would be in areas where only a few feet of sediment would be removed. Some sandy substrate would likely remain on the surface of the rip-rap levees, even after removal attempts. Also, the dredging would occur along a relatively small portion of the confluence area shoreline, and while most of the near-shore dredging will occur in the lower Clearwater River, most fall chinook outmigrants are produced in the Snake River. Benthic organisms in the dredged areas would be removed but the benthic community should quickly re-establish in the dredged areas (6 months to 1 year, Bennett and Shrier 1987, Bennett et al. 1991, 1997).

The Corps believes that most lifestages of the Snake River fall chinook salmon stock would be unaffected or benefited by enhancing shallow water rearing habitat structure along the shoreline immediately upriver of Knoxway Canyon, where mid-depth water would be raised to at least a shallow-water elevation at around 10 - 20 feet (Figure 32). The resultant acreage of open, sandy shallow water habitat should result in increased diversity of physical habitat and forage species preferred by rearing subyearling chinook salmon while simultaneously decreasing habitat suitable for rearing of predator species on salmonid smolts, such as smallmouth bass and Northern pikeminnow.

In addition, we believe that most lifestages of the Snake River fall chinook salmon stock would be unaffected by habitat alteration at the confluence, again because habitat-dependent early lifestages do not typically occur at the dredging areas in the confluence due to the impacted nature of the bathymetry from multiple years of previous dredging activity back to the late-1970s or because of the migratory nature of the occurrence of use by juvenile and/or adult fall chinook.

The proposed actions would not affect Snake River spring/summer chinook salmon stocks, because no individuals of these stocks should be present in the Snake or Clearwater rivers during the winter in-water work window of December 15, 2000 through March 1, 2001. No adult Snake River chinook salmon are typically counted at Lower Granite Dam until March (Corps Annual Fish Passage Reports 1991-1999). In addition, there should be no effect on individuals of these stocks through alterations of critical habitat caused by dredging, because these stocks use the proposed dredge areas only as migration corridors.

Adult steelhead migrate through the reach between June and November. Wild adult steelhead migrate through the reach between June and August for the A-run and between late August and November for the B-run. Wild adult Snake River Basin B-run steelhead migrating to the Middle and South Forks of the Salmon River for spawning in March through May be present in the mainstem channel adjacent to the project

area during the time of dredging activities. Adults from this stock may be migrating in deeper water or individuals may be holding in midchannel pools prior to moving upriver into tributaries for spawning in early spring. These fish would likely be sufficiently aware and agile to avoid the dredging equipment and move away from the low concentration turbidity plumes of short-duration caused by the suspension of sediment (Newcomb and Jensen 1996). Suspended sediment concentrations downriver of the site should be very similar to background NTU measurements collected upriver and well below the level that would cause direct mortality and would be of short enough duration (pulses lasting less than 12 hours per day) to not cause delayed physiological effects (Bennett and Shrier 1986, Newcombe and Jensen 1996).

The turbidity plume may temporarily discourage steelhead from moving upriver. However, by the time the dredging operation begins in mid-December, the peak of the steelhead fishing season should have passed. In 1996, the peak of the fishing season was in November to early December. For the past three years, the steelhead season has been winding down by the first of January. Therefore, the dredging operation should have a minor impact on Snake River Basin steelhead.

Other life-stages of Snake River Basin steelhead should not be present at the confluence during the proposed dredging period. Juvenile steelhead migrate downstream through the area mostly between late March and the end of August. In-water work will take place between December 15 - March 1 to minimize conflicts with returning adult steelhead and chinook salmon and outmigrating smolts.

Critical Habitat designated for Snake River Basin steelhead overlaps that designated for Snake River spring/summer chinook salmon. The effects on habitat components such as EFH are addressed above in the chinook salmon discussion.

C. Candidate or Proposed for Listing Species

None

D. Species of Concern

Any other aquatic species of concern which may be affected by this project are also migratory or mobile species with critical habitat requirements or timing needs for migration of lifestages passing through the mainstem lower Snake River. Care in construction timing and activities will be taken to insure these species are not inadvertently harassed, injured, or killed during the dredging and disposal activities.

The following species of concern are listed by the US Fish and Wildlife Service (USFWS) and may occur in the vicinity of the proposed project:

Pacific lamprey *(Lampetra tridentata)*
River lamprey *(Lampetra ayresi)*
Westslope cutthroat trout *(Oncorhynchus (= Salmo) clarki lewisi)*
White sturgeon *(Acipenser transmontanus)*

Anadromous populations of these species would also be of concern to NMFS, several tribes, and the WDFW, and could be included under the purview of NMFS and/or USFWS ESA review responsibilities. Analysis of effects could assist in preclusion to future listings under ESA. These species and their stocks are predominantly mainstem or tributary life-forms. Of these species or their stocks, only white sturgeon have been widely documented to use the mainstem of the lower Snake River and the confluence of the Clearwater and Snake Rivers for rearing, feeding, or overwintering. No spawning habitat is present in the proposed project area for any of the species. No Designated Critical Habitat and EFH have been established by NMFS or USFWS for these species and/or their stocks. Pacific lamprey juveniles may have a minimal likelihood of being present in the proposed project area. Habitat suitable for lamprey rearing may also be present, although the degree of suitability is relatively unknown. No documented use of any habitat type by westslope cutthroat trout has been recorded for backwaters of the Snake River. White sturgeon prefer depths down to 60 feet deep and associated velocities for all lifestages. Care is taken not to create shallow water habitat overtopping an adequate mid-depth bench or deep water zone known to be suitable for white sturgeon.

E. Other listed species

The USFWS has identified another fish species listed as threatened, bull trout (*Salvelinus confluentus*), that may occur in the project area. The Corps determined the proposed dredging for 2000-2001 "*May Affect, But Is Not Likely to Adversely Affect*" bull trout. The Corps documented this determination in a separate BA that was sent to USFWS on September 18, 2000 for their concurrence.

<u>Cumulative Effects</u>

Indirect effects, interdependent effects, or interrelated effects would likely not be significant due the existing human impact regime and based upon over 10 years of data and experimentation compiled by Dr. David Bennett and associated University of Idaho research and monitoring on the suitability of created rearing habitat compared to the suitability and critical components of paired reference sites. Dredging of boat basins and access to such basins should provide little increased use in the number of net recreational boats or commercial boating ventures. Since the depth of the navigation

channel and all access channels remains relatively shallow at 14 feet for shallow draft vessels, it is anticipated that very few deeper draft vessels would be capable of utilizing the areas dredged.

The proposed dredging project is the latest in a continuing series of dredging operations to maintain navigation, port, and recreational use of the lower Snake, Clearwater, and Columbia Rivers. The Corps anticipates that dredging will continue to be needed in the confluence area to remove accumulated sediment and should have a Dredged Material Management Plan (DMMP) EIS coordinated, reviewed, and completed in the summer of 2001. A Regional Dredging Team (RDT) for the lower Snake River and McNary reservoir was formed in July 2000 to coordinate and review future dredging needs, priorities, and activities, especially options for beneficial use disposal. The studies conducted by Dr. Bennett indicate there may be beneficial uses of the dredged material in the reservoir if certain criteria are followed in the selection and placement of the material.

PFC Pathways and Indicators:

1. Benthic Invertebrates

The newly placed disposal material may type-convert and enhance the existing, but marginal quality rearing habitat along the shoreline. Benthic invertebrates inhabiting the dredged material will be displaced to colonize the disposal sites. The seasonally productive benthic communities should quickly re-establish with the same species composition and abundance shortly after the effects of construction have subsided and the next growing/production season returns. No additional displacement over seasonal background levels should occur or persist.

2. Water Quality

Increases in turbidity and debris from equipment operation during removal and disposal of the dredged material should be expected. Any unanticipated impacts due to dredging activities should be minimal, localized, and regulated by direct monitoring with comparison of activity parameter levels against background according to the conditions set forth by the WDOE.

Some unmeasurable degree of competition for food or predator avoidance can be expected for the short-term few months following construction. This effect may transfer into a slight reduction in the ability of part of the population to successfully produce a high rate of weight gain during the late-spring post-construction activity period. Any permit requirements for water quality certification should also act to directly protect fishery resources that would be present or in the near vicinity.

3. Habitat Access

The proposed dredged material removal and disposal should pose no effect to impeding access to the migration corridor and/or tributary or backwater rearing habitat for any listed salmon or steelhead stock.

4. Habitat Elements

The proposed actions would not likely adversely affect any adult Snake River spring/summer or fall chinook or sockeye salmon or Snake River Basin steelhead. Beneficial disposal is designed for increasing both the quantity, distribution, and quality of juvenile fall chinook rearing habitat sites.

The proposed disposal sites are currently designated critical habitat for Snake River salmon ESU stocks and the Snake River Basin steelhead ESU stocks (Federal Register, February 5, 1999, Volume 64, Number 24). The shoreline and shallow water habitat enhancement proposed would not negatively affect the suitability of that habitat for rearing or resting Snake River fall chinook and/or Snake River Basin steelhead. Habitat-dependent early lifestages of fall chinook salmon would likely only utilize the existing shoreline area minimally due to previous impacts and type conversion from a combination of reservoir filling and shoreline protection via riprap sized armoring that directly transitions into open water.

The proposed action of enhancing rearing habitat both quantitatively and qualitatively, as well as better distribution spatially with newly created shorelines and bench transition zones that target fall chinook rearing component preferences could have long-term benefits to the anadromous and resident fishery resources within the lower Snake River, hence no unanticipated long-term negative impacts should exist. The proposed action should increase overall fish population health and abundance. Impacts due to the proposed dredge material removal and disposal activities are expected to be short-term concerns that will be adequately monitored at the real-time scale in accordance with state and federal water quality criteria. Mild increases in turbidity should be localized and incremental, and are expected to have short-term environmental impacts along with possible organic waste solids and liquids from equipment operation of the two dredge platforms. Control provisions will be in place to minimize adverse impacts of construction on the environment. Any permit requirements for water quality certification should also act to directly protect fishery resources present in the work area.

Construction activity would involve noise from heavy equipment and human activity. Disturbance to fishery resources should be minimal compared to the existing condition. Biological organisms respond to disturbance either by avoidance or habituation. Short-term disturbance would probably cause temporary avoidance but would have no long-

term effects. Species that cannot avoid disturbance may become habituated if they are present in the near vicinity of the construction activities.

6. INCIDENTAL TAKE

No adverse effect that could result in Incidental Take of Snake River sockeye, fall chinook, and/or spring/summer chinook salmon or Snake River or Middle Columbia River steelhead ESUs is anticipated because none to very few of these stocks should be occupying or utilizing the lower Snake River reservoir habitats during the established in-water work window during the winter dates of December 15, 2000, through March 1, 2001. The suitability of existing habitat is marginal due to repeated impacts from previous dredging actions performed since 1975, therefore shallow water habitat enhancement for rearing fall chinook juveniles through proper in-water disposal is desirable to protect and enhance productivity and survival of Snake River fall chinook.

7. RECOMMENDED CONSERVATION MEASURES

A. Disposal of dredged material is designed for beneficial use. Silt/sand mixes will be placed at the RM 116 site as a base for a 10 feet plus deep capping of 80+% sand. Cobbles and larger gravels removed from the Lower Monumental Dam navigation lock approach will be placed at RM 22 to provide interim habitat diversity until which time the cobbles are needed for beneficial use, such as armoring against wave action along the riverward slope of newly created shallow water habitat. The proposed placement of dredged material will act to mitigate for lost shoreline and shallow bar rearing habitat utilized by juvenile Snake River fall chinook salmon and should result in long-term benefits to anadromous fish production and survival within the lower Snake River migration corridor.

B. All work will be completed within the established in-water work window of December 15, 2000, through March 1, 20001.

C. Prior to dredging, the lock approaches of Lower Granite and Lower Monumental dams will be surveyed for redds according to established protocol (Dauble et al. 1995) to determine if modifications to velocity and substrate could cause salmon to avoid these areas for spawning. If redds are found and verified, then location and duration of dredging will be modified to accommodate avoidance and protection of any verified redds.

D. The Corps has prepared a monitoring plan for the 2000-2001 dredging and disposal activities. The Corps would require the contractor to take water samples and measure turbidity using a naphalometer twice per day during active dredging. The contractor would take samples one hour after dredging begins and one hour before dredging ends each day. Samples would be taken 300 feet upstream from the dredging operation and

300 feet directly downstream from the point of dredging. The contractor would take 2 measurements at each location: 1 meter below the water surface and 1 meter above the river bottom. The contractor would be required to notify the Corps within 8 hours in the event that the turbidity levels measured of the dredging operation exceed allowable levels. These levels are defined as 5 NTU's over background when background is 50 NTU's or less, or more than a 10% increase in turbidity when the background is more than 50 NTU's. Background is measured 300 feet upstream of the dredging operation. The contractor would, immediately upon determining any exceedence of this NTU limit, alter the dredging operation and continue monitoring turbidity at the downstream location until the NTU levels to returned to an acceptable limit above background. If the NTU levels did not return to an acceptable limit, the contractor would stop dredging and wait for the NTU levels to drop before resuming dredging. If the contractor is unable to alter his dredging operation to meet turbidity requirements, he would contact the Corps for further instructions.

The Corps would also conduct monitoring. The Corps would set up YSI Sondes® water quality instruments (self-contained recording devices) to take hourly readings of turbidity, dissolved oxygen, pH, and conductivity. The YSI Sondes would be stationed 300 feet upstream of the dredging operation, 300 feet downstream of the dredge, upstream of the in-water disposal areas, 300 feet downstream of the two shallow/mid-depth disposal sites (one YSI Sonde at each site), and 300 feet downstream of the deep water site. The Corps would download the YSI Sonde information daily and analyze the data to ensure water quality standards were being met.

E. In the event that a pocket of contaminated sediments is hauled up in the clamshell or bucket, the Corps would direct that such an area would be classified and investigated as Hazardous Waste and deposited in a truck for removal to an appropriated established waste disposal site.

8. CONCLUSIONS DETERMINATION OF EFFECT

Informal consultation with the NMFS under Section 7 of the ESA for these proposed activities is requested. Based on the above information, it is determined that the above described actions *"May Affect, But Are Not Likely To Adversely Affect"* individuals of Snake River sockeye, spring/summer chinook, or fall chinook salmon, and/or Snake River Basin steelhead ESUs, or act to jeopardize their continued existence, or act to preclude their survival or recovery through potential adverse modification of rearing and migration components of their critical habitat. This determination is based on all work being performed within the designated in-water work window of December 15th through March 1st which minimizes the effects on migrating or rearing salmon and steelhead that should not be present during the winter work window. The dredged material removal and disposal activities and their by-products, such as short-term turbidity plumes, should be easily avoidable by either juvenile or adults of any listed salmonid stock that

would be either rearing or migrating within the mainstem Snake River. The dredging activities by non-hydraulic techniques should be harmless. We also believe that the disposal activity adding to increase the area of the mid-elevation bench associated with Knoxway Canyon would not adversely affect critical habitat for the listed stocks of Snake River chinook and sockeye salmon or Snake River steelhead, and should be beneficial to Snake River fall chinook salmon juvenile rearing through increasing available, suitable, and functional habitat in open sand with increased macroinvertebrate production. Some white sturgeon habitat could be effectively displaced by conversion to shallow water habitat more suitable for fall chinook salmon rearing.

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Appendix C

Endangered Species Act Biological Assessement For Terrestrial Species and Non-anadromous Fish

INTERIM NAVIGATION AND MAINTENANCE DREDGING AND DREDGED MATERIAL DISPOSAL PLAN LOWER SNAKE RIVER 2000/2001

BIOLOGICAL ASSESSMENT FOR NON-ANADROMOUS FISH AND TERRESTRIAL SPECIES

U. S. Army Corps of Engineers
Walla Walla District
201 N. 3rd Avenue
Walla Walla, WA 99362

In Compliance with the Requirements of the Fish and Wildlife Coordination Act and the Endangered Species Act

September 2000

TABLE OF CONTENTS

1.0 INTRODUCTION

The Walla Walla District, Corps of Engineers is proposing to conduct navigation and maintenance dredging on the lower Snake River in Washington state and at the mouth of the Clearwater River in Idaho. Dredging will take place during the winter of 2000/2001 at nine sites associated with four dams operated by the Corps on the lower Snake River [Plate 18 from the Environmental Assessment (EA)]. This is considered an interim project pending finalization of the Corps' 20-year Dredged Material Management Plan (DMMP). The purpose of the dredging is to restore the authorized depth of the navigation channel, remove sediment from port areas, provide for recreational use, and provide for irrigation of wildlife habitat.

As part of the environmental review process, the Corps is conducting assessments of the potential impacts of project actions to species listed under the Endangered Species Act (ESA). For the purposes of this biological assessment, only non-anadromous fish species, and terrestrial flora and fauna are evaluated. Correspondence with the U. S. Fish and Wildlife Service (USFWS) in July 2000 identified federally listed species that occur or may occur in the project vicinity. These included: bald eagle (*Haliaetus leucocephalus*), bull trout (*Salvelinus confluentus),* and Ute ladies' tresses (*Spiranthes diluvialis*). In addition, Spalding's silene (*Silene spaldingii*) is proposed for listing and may occur in the project area.

2.0 PROJECT DESCRIPTION

The Corps is authorized by the River and Harbor Act of 1945 (Public Law 79-14) to maintain a navigation system on the lower Snake and Columbia Rivers. The navigation system includes five reservoirs: Ice Harbor, Lower Monumental, Little Goose and Lower Granite reservoirs on the Lower Snake River, spanning the region from Tri-Cities, Washington east to Lewiston, Idaho; and McNary reservoir on the Columbia River between Umatilla, Oregon and Tri-Cities, Washington. These reservoirs are part of the Columbia/Snake River inland navigation waterway, which provides slack-water navigation from the mouth of the Columbia River near Astoria, Oregon, to port facilities on the Snake and Clearwater Rivers at Lewiston, Idaho, and Clarkston, Washington. Each of these reservoirs has required some level of dredging on a periodic basis to maintain the navigation channel at the minimum authorized depth of 14 feet.

The Corps also maintains recreation facilities and irrigated wildlife habitat management units (HMU's) as part of the lock and dam projects. HMU's are designated areas where the Corps has made vegetative improvements to provide habitat for various game and non-game wildlife species. Often, these areas require irrigation to maintain the planted vegetation. The boat launch facilities and swimming beaches at the recreation sites periodically require dredging to remove accumulated sediment that reduces water depth and interferes with recreational use. The irrigation intakes at the wildlife HMU's also require periodic dredging to remove sediment that clogs the pumps.

To maintain the navigation channel and other facilities during this interim period, the Corps proposes to dredge approximately 244,269 cubic yards of material. The majority of the dredging would take place in the Clarkston, Washington/ Lewiston, Idaho area at the confluence of the Snake and Clearwater Rivers (Plate 19 from the EA). This confluence area has a chronic

sedimentation problem caused by the two rivers converging in slackwater at the upstream end of Lower Granite reservoir. The Corps also plans to remove sediment from the Port of Clarkston at RM 139 on the Snake River (Plate 20), and the Port of Lewiston at RM 1 – RM 1.5 on the lower Clearwater River (Plate 21). Additional areas to be dredged in the confluence area include the entrance to Hells Canyon Resort Marina on the Snake River at RM 138 in Clarkston (Plate 22), the Greenbelt Boat Basin at RM 139.5 on the Snake River at Clarkston (Plate 23), and the Swallows Park swimming beach and Swallows Park boat launch (RM 141.7 and RM 141.9) on the Snake River at Clarkston (Plate 24). Table 1 shows estimated quantities of dredging material at each location.

The Corps plans to dredge several other areas outside of the confluence area in 2000-2001. Two of these are for navigation channel restoration – the downstream approach to Lower Granite Dam navigation lock (RM 107) (Plate 25) and the downstream approach to Lower Monumental Dam navigation lock (RM 41.5) (Plate 26). An area about 500 feet long by 200 feet wide would be dredged downstream of the Lower Granite navigation lock guidewall. The Lower Monumental approach is about 250 feet wide and extends about 2,300 feet downstream from the navigation lock. There are also two boat launch areas at two Corps recreation sites that the Corps plans to dredge: Illia boat launch at RM 104 (Plate 27) and Willow boat launch at RM 88 on the Snake River (Plate 28). There is also one irrigation intake at Hollebeke HMU (RM 25) that requires sediment removal (Plate 29). The dredging at the intake may also involve dredging an access channel about 1,000 feet long from the Snake River to the intake.

Table 1. Proposed dredging 2000/2001

Site to be Dredged	**Quantity to be Dredged (in cubic yards)**	**River Mile**
Federal navigation channel at confluence of Snake and Clearwater Rivers	183,120	SR 136-139.5 CR 0-1
Port of Clarkston	5,559	SR 139
Port of Lewiston	1,700	CR 1-5
Hells Canyon Resort Marina	3,532	SR 138
Greenbelt Boat Basin	2,747	SR 139.5
Swallows swim beach	24,850	SR 141.7-141.9
Lower Granite Dam navigation lock approach	3,139	SR 107
Lower Monumental Dam navigation lock approach	10,987	SR 41.5
Illia boat launch	1,439	SR 104
Willow Landing boat launch	3,924	SR 88
Hollebeke HMU irrigation intake	3,270	SR 25
TOTAL	**244,269**	

All dredging will be done using mechanical dredging methods. These include clamshell, dragline, backhoe and/or shovel/scoop, although based on previous dredging activities, the method used would probably be clamshell for most of the dredging. For the boat basins and the irrigation intake dredging, the method would most likely be backhoe.

All dredging and disposal actions will take place within the established in-water work window of December 15 – March 1 to avoid impacting anadromous fish. Prior to dredging, the Corps will conduct salmon redd surveys in areas likely to contain redds to ensure no redds would be disturbed by dredging or disposal. Based on previous surveys, it is anticipated that redds are most likely to be found only in the dredging areas immediately downstream of the dams.

Disposal of dredged material will occur at two in-water sites within the project area. For all of the dredging except the Lower Monumental Dam navigational lock approach, the disposal location would be at RM 116 in Lower Granite reservoir (Plates 30 and 32). The Corps selected this site because it is close to the confluence (where most of the dredging would occur), could provide suitable resting/rearing habitat for juvenile salmon once the river bottom is raised, would not interfere with navigation, would not impact cultural resources, and is of sufficient size to accommodate dredged material disposal for several years. The material removed from the Lower Monumental navigational lock approach would be disposed of at Lost Island HMU in the Ice Harbor reservoir, located at RM 22 (Plate 31). The site is on the downstream end of a river bar and was used as the disposal site for the 1998-1999 dredging of the same navigation lock approach.

The selected method of in-water disposal is intended to create shallow-water and mid-depth habitat that will benefit salmonids, particularly juvenile Chinook salmon. This is based on research conducted in the Lower Granite Reservoir (Bennett et al., 1995). Several years of research on dredged material disposal indicated that disposing of sand and cobbles in mid-depth or shallow water sites can be beneficial by creating shallow areas where juvenile salmon can rest and evade predators.

Bennett et al. (1995) indicated that substrate of sand, gravel, and/or cobble provided suitable habitat for juvenile salmon while a silt substrate provided no benefit. Following these criteria, the Corps proposes to place the dredged material in steps. At the Lower Granite disposal site, the first step would be to use the silt (less than 0.2 mm in diameter) in a mixture with sand and gravel/cobble to fill the mid-depth portion of the site and form a base embankment (Plate 32). The dredged material would be placed aboard bottom dump barges and analyzed to determine the percentage sand or silt. The barges would then proceed to the disposal area and would dump the material within the designated footprint close to the shoreline to raise the river bottom to a depth of 20 feet (Figure 2). The second step would be the placement of sand on top of the sand/silt embankment (Figure 3). The contractor would be directed to reserve an area of sand as his final dredging site. The contractor would use barges to dump the sand on top of the base embankment so a 10-foot thick layer of sand covers the embankment and the water depth is about 10 feet deep. The footprint of the disposal area would be sized so that the maximum amount of shallow water sandy substrate habitat is created with the estimated quantities of material to be dredged. The third phase would be to use a beam drag to flatten and level the tops of the mounds to form a flat, gently sloping shallow area between 10 and 12 feet in depth (Figure 4).

A similar disposal method would be used at the Lost Island HMU. Water depth at the site is about 35 feet deep. A small mound of cobbles from the previous disposal is located near the

shoreline. The contractor would nudge the barge as close to the river bank as possible at the upstream edge of the disposal area before dumping the material on top of the existing mound. The contractor would continue to dispose of dredged material on top of the mound until the water was 15-20 feet deep. He would then dump material on the downstream slope of the mound to create an embankment parallel to the shoreline.

3.0 PROJECT IMPACTS ON LISTED AND PROPOSED SPECIES

3.1. Bald Eagle (*Haliaetus leucocephalus*)

3.1.1 Habitat Requirements/Population Status

During the nesting season (February 1 through August 15), bald eagles use breeding habitat close to rivers, lakes, marshes, or other food sources. Important habitat components include nest trees, perch trees, and available prey. Live, mature trees with deformed tops are often selected for nesting, and nests are often reused year after year. Snags, trees with exposed lateral branches, or trees with dead tops are important for perch-sites while hunting or defending territories. Perches used for foraging are normally close to water where fish, waterfowl, seabirds, and other prey can be captured. Nest locations are usually in fairly remote river and lake sections, especially when new nesting areas are colonized. As nesting colonies grow, the eagles will become more tolerant of human activities in and around the nest.

Wintering season for eagles runs from November 1 through March 15. Wintering bald eagles congregate along rivers, lakes, and streams, where winter runs of salmon provide an abundant prey base. Waterfowl concentrations is also an important winter food source. In eastern Washington, mixed stands of black locust and black cottonwood provide important roosting and perching habitat. Waterfowl and carrion provide a high percentage of their diet in this region.

3.1.2 Known Occurrences in Project Vicinity

There are no reported bald eagle nests within 20 miles of any work site in the project area. The closest nests are two first year attempts (2000). One is near the mouth of the Snake River (RM 1) on Strawberry Island. The other was on Dworshak Reservoir on the North Fork Clearwater River. Both of these nests were unsuccessful. The nearest successful nesting occurred about 80 miles south of Clarkston on the reservoir above Hells Canyon Dam. Since most of the lower Snake River lacks large cottonwoods and other large tree species near the shore there is very little suitable nesting habitat in the project area. The Strawberry Islands or areas upstream of the mouth of the Clearwater River are the closest areas with good nesting potential.

Based on data from Corps mid-winter surveys, bald eagles may be present in the project area during the winter but at very low numbers. Mid-winter censuses have been conducted on the lower Snake and Columbia Rivers from the McNary Dam (on the Columbia below the confluence with the Snake) to Asotin, WA (2 miles upriver from Clarkston) annually since 1989. These surveys generally take place in January and are divided into two survey areas. The

Western Project survey area extends from McNary Dam to the Lower Monumental Dam. The Eastern Project area extends from Lower Monumental Dam to the upper influence of the Lower Granite Reservoir, near Asotin, WA. Surveys were typically conducted in January and were confined to Corps-managed lands along the rivers. No communal night roosts have been found on the lower Snake River by biologists.

The last five years of survey results were summarized to show average annual bald eagle occurrence. In the Western Project area, bald eagle counts ranged from 11 to 19 individual birds annually. Most of these individuals were seen on the McNary Pool. Lower Snake River numbers below Lyon's Ferry have been between 1-5. In 1997 and 1998, a single adult bald eagle was seen at Lost Island Habitat Management Unit, one of the two proposed dredged material disposal sites. In January 2000, an adult bald eagle was observed perched on a rock bluff at the downstream end of Windust Park, 1.5 miles from the Lower Monumental Navigational Approach dredge site.

In the Eastern Project area, between three and five individual bald eagles per year have been counted. One or two of these are usually found in the Snake/Clearwater confluence area, the others have been sighted on the Tucannon River (SR 62) and at Moses HMU (SR 129.5) in the Lower Granite reservoir, approximately nine miles downstream from the confluence of the Snake and Clearwater Rivers.

The eagles tend to congregate in areas of waterfowl concentrations. These areas are usually associated with a waterfowl food source. These are usually at grain loading facilities on the river or recently harvested crop fields. Grain loading terminals are found at Sheffler (SR 29), Windust (SR 38.2), Upstream Lower Monumental Dam (SR 42), Lyon's Ferry (SR 61), Central Ferry (SR 83.5), Almota (SR 104), Port of Whitman (SR 135.2-136.5), Port of Clarkston (138.4), and Port of Lewiston (CR 1.5). Other areas can attract waterfowl for loafing and resting. These are usually associated with HMUs along the river that may have some pastures and backwater areas. These areas (especially the irrigated sites) will also have trees large enough to support perching eagles. Irrigated recreation areas can also provide this type of habitat.

3.1.3 Effects of the Action

Due to the timing of the project and lack of nesting activity in the project area, the dredging and disposal activities will not impact nesting bald eagles. There is limited use of the project area by wintering bald eagles; however, potential for disturbance of wintering eagles does exist. Human activities occurring near perching or foraging eagles may cause them to temporarily leave the area.

The majority of the dredging will take place at the Snake/Clearwater confluence area. Eagles wintering in this area are habituated to daily human activity. Fishing boats and barge traffic generate noise and human disturbance on a daily basis. Dredging is less likely to impact bald eagles in a setting where human disturbance already exists.

On the lower Snake, near the Upper Granite and Lower Monumental dredge sites, an average of two barges pass the locks daily. Dredging operations would increase human activity and noise

levels over these existing background levels. A grain loading facility on the Snake River just west of the confluence with the Clearwater often attracts waterfowl, which in turn may attract bald eagles. Dredging at the confluence has potential to disrupt both the eagles and the waterfowl.

3.1.4 Conservation Measures

Due to the potential for disturbing wintering eagles, a wildlife biologist will conduct surveys at dredge or dredge disposal sites, which have the highest potential for eagle presence, immediately prior to the commencement of activities at that site. Activities will not commence while bald eagles are using the project area. This applies to eagles that are within 0.25 miles when out of line-of-site of the activity and within 0.5 miles when in line-of-site of the activity. The dredging sites which have the lowest potential for bald eagle presence are Lower Granite Dam and Willow boat basin. All other sites listed in Table 1 will be surveyed for eagle presence. The disposal areas at Knoxway Canyon and down stream of Lost Island both have a very low potential for bald eagle presence. This is due to the fact there is no habitat or waterfowl attractants within ½ mile of either of these sites. Although an eagle was seen at Lost Island HMU, the habitat which would attract eagles is over ½ mile upstream of the proposed disposal site. Knoxway Canyon is on a very remote section of the river, upstream of Lower Granite Dam. No HMUs or grain loading facilities are within 2 miles of this site. Lower Granite Dam is in a remote section of the river with no habitat for bald eagles and no grain loading facilities or developed HMUs within 2 miles of this structure. The activity on the dam itself acts as a deterrent to eagles.

3.1.5 Determination of Effect

Due to the conservation measures that will be implemented to avoid disturbance to roosting or foraging eagles, this project may affect, but is not likely adversely affect bald eagles.

3.2 Bull Trout (*Salvelinus confluentus*)

3.2.1 Habitat Requirements/Population Status

Bull trout are native inhabitants of most major river drainages in the Pacific Northwest. They are widespread throughout the Columbia River Basin, including occupation of many tributaries to the Snake River. Populations have declined throughout the area due to human impacts. Habitat components that appear to influence bull trout distribution and abundance include water temperature, cover, channel form and stability, valley form, spawning and rearing substrates, and migratory corridors (Oliver, 1979; Pratt, 1984, 1992; Fraley and Shepard, 1989; Goetz, 1989).

Bull trout are strongly influenced by temperature (Brown 1992). In general, water temperature above 15°C (59°F) is believed to limit bull trout distribution (USFWS 1998 citing Fraley and Shepard 1989). Brown (1992 citing Allan 1980 and Shepard et al. 1984b) reports spawning streams rarely exceed summer temperatures of 18°C. Temperature at redds during spawning (August through November) is typically between 4 and10°C (39-51°F) (USFWS 1998 citing Goetz 1989, Pratt 1992, and Rieman and McIntyre 1996). Adult bull trout may be more

temperature tolerant during migration, having been found migrating and staging in 20 to 24°C water (Brown 1992 citing Kraemer, WDW Mill Creek, WA, pers. comm.).

Spawning occurs from August to November in slow-moving streams. Redds are often constructed in stream reaches fed by springs or near other sources of cold groundwater. Spawning substrate consists of loose, clean gravel relatively free of fine sediments. Eggs incubate for 100 to 145 days, and fry remain in the substrate for an additional 60 to 100 days. Side channels, stream margins, and pools with suitable cover are important habitats for juvenile fish.

Adult bull trout may either be resident or migratory. Resident bull trout complete their life cycle in the stream in which they spawn and rear, often moving to downstream pools with adequate cover to overwinter (Jakober 1995) from approximately November through May. Migratory bull trout spawn in tributary streams, where juvenile fish rear one to four years before migrating to either a lake (adfluvial), river (fluvial), or saltwater (anadromous). Migratory bull trout frequently begin migrating to spawning grounds in April, remaining there through the fall and returning to the lake or river to overwinter.

Winter habitat requirements for migratory bull trout have not been well described. Brown (1992, citing Goetz 1989, Allan 1980, and Kraemer 1991) describes fluvial populations of bull trout overwintering in deep pools or lower reaches of mainstem rivers. Jakober (1995) found bull trout overwintering in deep beaver ponds or pools containing large woody debris and suggested the importance of cover and temperature at overwintering sites.

3.2.2. Known Occurrences in Project Vicinity

Major tributaries to the Snake River below the Hells Canyon Dam that support bull trout include: the Tucannon River, the Clearwater River, Asotin Creek, the Grande Ronde River, the Imnaha River and the Salmon River. Of these, the Tucannon is the only tributary with clear evidence of individual bull trout migrating to the mainstem Snake River in the project area (USFWS 2000). There have been several observations of adult bull trout passing Lower Monumental and Little Goose dams. From 1994 to 1996, there were 27 bull trout passing the adult fish counting station (mainly in April and May) at Little Goose Dam. At least six bull trout passed counters at Lower Monumental and Little Goose dams in 1990 and 1992 (Kleist 1993). Kleist also observed one bull trout in 1993 just downstream of the count window at Lower Monumental Dam, and one bull trout was captured in the Palouse River below Palouse Falls in 1998. These were likely migratory fish from the Tucannon River (USFWS 2000) overwintering in the Snake River or its reservoirs. One bull trout was observed at Lower Granite Dam in 1998 that may indicate fluvial fish are migrating to other upstream populations. Little is known about how bull trout use these areas during winter. A bull trout was also seen passing Ice Harbor Dam in 2000, which was probably from the Tucson River. Adfluvial bull trout would likely use the deep pools of the reservoirs, seeking out colder water and hiding habitat. The selection of foraging habitat would likely be based on the location of prey (mainly concentrations of smaller fish).

The status of bull trout associated with the Tucannon River was rated as "healthy" by Washington Department of Fish and Wildlife (1997), although some habitat degradation has

occurred due to timber harvest and recreational use. It is not currently at risk of extinction, and is not likely to become so in the foreseeable future because of sufficient habitat protection (wilderness designation) in the upper watershed and the lack of brook trout encroachment from Pataha Creek. The Pataha Creek subpopulation is at risk of extinction as a result of habitat degradation and competition and hybridization from brook trout.

The Clearwater and Grande Ronde Rivers also have populations of bull trout that could potentially migrate to the project area; however, evidence suggests that this is rare, and the potential to impact these populations through activities in the lower Snake River is extremely small (USFWS 2000).

3.2.3. Effects of the Action

Migratory bull trout from the Tucannon River may be present at dredging and dredged material disposal sites below the Lower Granite Dam during the proposed window of operation. It is less likely that bull trout would be present in the vicinity of the Snake/Clearwater confluence where most of the dredging would take place. The potential for small numbers of bull trout to be present at either location, however, necessitates the discussion of possible impacts.

Dredging will be completed using mechanical means, primarily by means of a clam shell. Due to the characteristics of this equipment, it is unlikely that the dredging would cause direct mortality to fish. Specifically, the clamshell bucket descends to the substrate in an open position. The force generated by the descent drives the jaws of the bucket into the substrate, which "bite" the sediment upon retrieval. During the descent the bucket remains in an open position, and thus would be unlikely to trap or contain fish.

There is potential for the dredging operation to displace fish from the immediate dredging area. Fish are known to respond evasively to a variety of stimuli (Popper and Carlson 1998). The noise of the tugboat engine pushing the transport barge may cause any bull trout present to leave the dredging area. The disturbance caused by the mechanical dredge as it enters the water and removes material will also tend to cause any bull trout present to leave the dredging area. Except in the very shallow disposal sites, the sudden stimulus of the nose or shock wave associated with the release of the dredged material, or the sudden decrease in light, would be expected to startle fish and induce them to dart away from the source (Anderson 1990). The ability of fish to move away from the disturbance prevents them from being harmed directly by the dredging, but has potential to cause excess energy expenditure and loss of habitat use.

Dredging and disposal would cause temporary and localized impacts by increasing turbidity and suspended solids. Background turbidities in the lower Snake River reservoirs range from 10 to 200 NTUs, depending on rainfall and runoff (R. Heaton, U.S. Army Corps of Engineers Walla Walla District, personal communication). Van Oosten (1945) concluded from a literature survey that average turbidities as high as 200 NTUs do not harm fish. In the winter, during dry weather, background turbidity is expected to be at the low end of this range. The contractor will be required to monitor turbidity levels up and downstream of the operation. Operations causing a 5

NTU increase over background (10 percent increase when background is over 50 NTUs) at a point 300 feet downstream will not be allowed.

3.2.4. Conservation Measures

In light of potential impacts to anadromous fish, the Corps has implemented dredging policies that require the use of mechanical dredging equipment. More efficient, hydraulic dredges have potential to cause direct mortality to fish through use of a cutterhead and suction pump which can pull fish into the equipment and damage or kill them in the process. Grab, bucket, or clamshell (mechanical) dredges, as proposed for this project, provide little or no potential for fish to become entrained or harmed. The corps views the tradeoff in efficiency as worth the gain for protecting bull trout and anadromous fish. The Corps has used mechanical dredging on the District since 1987 and will continue to do so.

Measures to minimize turbidity will be taken. Contractors will be required to monitor turbidity levels and will not be allowed to cause increases of more than 5 NTUs over background levels or 10 percent when background is over 50 NTUs.

3.2.5. Determination of Effect

Dredging and disposal operations will occur during a time of year that bull trout may be present in the lower Snake reservoirs. Numbers of bull trout in the vicinity of the dredging operation are likely to be small, and the potential for fish to avoid impacts is high. Conservation measures will be taken to minimize the impacts of dredging equipment and turbidity. Thus, it is determined that the dredging and disposal operations may affect, but are not likely to adversely affect bull trout.

3.3. Ute ladies' tresses (*Spiranthes diluvialis*)

3.3.1. Habitat Requirements/Population Status

This orchid is a lowland species, typically occurring beside or near moderate gradient medium to large streams and rivers in the transition zone between mountains and plains. It is not found in steep mountainous parts of the watershed, nor along slow meandering streams out in the flats. It occurs in a variety of settings, including: floodplains; moist to wet meadows on floodplains, abandoned meander channels, moist to wet meadows irrigated by freshwater springs, riparian streambanks, borrow pits, upper edges of river banks, islands, point bars, and various topographic positions up to 200 feet horizontally and 0.5-4 feet vertically from water's edge, but not on steep slopes (USFWS, 1998). The communities where it is often found tend to be typical of riparian habitat in the area. The species tend to occupy graminoid (grasses, rushes and sedges) dominated openings in shrubby areas. It occasionally occurs in spring-fed wetlands in broad valleys isolated from watercourses. Soil moisture must be at or near the surface throughout the growing season. The species tolerates periodic flooding, but does not occupy constantly inundated areas (USFWS, 1998).

3.3.2. Known Occurrences in Project Vicinity

Ute ladies' tresses was discovered in Washington for the first time in 1997. It was also found in the Snake River Basin in southeastern Idaho in 1996. It is now known to be present in northern Washington, southern Idaho and nearby parts of Montana. The USFWS has determined that, in the absence of adequate surveys, this species may be expected to occur in suitable habitat throughout Idaho and Washington (USFWS 1998). There are no known occurrences in the project vicinity.

3.3.3 Effects of the Action

The proposed dredging and dredge disposal will take place within the river channel and will not impact habitats suitable for Ute's Ladies' tresses.

3.3.4 Conservation Measures

None of the proposed activities will take place within suitable habitat for Ute's ladies' tresses, therefore conservation measures are not necessary.

3.3.5 Determination of Effect

This project will not effect suitable habitat for Ute's ladies' tresses. There will be "no effect" on this species.

3.4 Spaulding's silene *(Silene spaldingii)*

3.4.1 Habitat Requirements/Population Status

Spaulding's silene occurs primarily within open grasslands with a minor shrub component and occasionally with scattered conifers. It is found most commonly in the Idaho fescue/snowberry plant association at elevations of 1900 – 3050 feet. These sites are typically dominated by Idaho fescue and have sparse cover of snowberry. Some of these sites occur in a mosaic of grassland and ponderosa pine forest. Populations have been found on all aspects, although there seems to be a preference for slopes which face north. On drier sites, the species can be found on the bluebunch wheatgrass/Idaho fescue association. Associated species include prairiesmoke (*Geum triflorum*), sticky geranium (*Geranium viscosissimum*), Wood's rose (*Rosa woodsii*), white stoneseed (*Lithospermum ruderale*), yarrow (*Achillea millefolium*), northwest cinquefoil (*Potentilla gracilis*), and hawkweed (*Hieracum sp.*).

Spaudling's silene generally occurs in native grasslands that are in reasonably good ecological condition, although populations have persisted in areas that have had moderate grazing pressure. Populations tend to be quite small and are currently quite fragmented, raising questions about their longterm viability. Fire may have historically played a role in maintaining habitat, particularly in sites that are interspersed with ponderosa pine forest.

3.4.2 Known Occurrences in Project Vicinity

There are no known occurrences of Spaulding's silene in the project area.

3.4.3 Effects of the Action

None of the proposed activities will take place within suitable habitat for Spaulding's silene, therefore this project will have no effect on Spaulding's silene.

3.4.4 Conservation Measures

Due to the lack of suitable habitat, no conservation measures are necessary to protect Spaulding's silene.

3.4.5 Determination of Effect

An effect determination is not required for this species until it is formally listed; however, this project will have no effect on Spaulding's silene.

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